



Oklahoma Comprehensive Water Plan Supplemental Report

Water Policy & Related Recommendations For Oklahoma

April 2011

This study was funded through an agreement with the Oklahoma Water Resources Board under its authority to update the Oklahoma Comprehensive Water Plan, the state's long-range water planning strategy. Results from this and other studies have been incorporated where appropriate in the OCWP's technical and policy considerations. The general goal of the 2012 OCWP Update is to ensure reliable water supplies for all Oklahomans through integrated and coordinated water resources planning and to provide information so that water providers, policy-makers, and water users can make informed decisions concerning the use and management of Oklahoma's water resources.

Oklahoma Comprehensive Water Plan



Water Policy and Related Recommendations for Oklahoma

The following report was developed for the 2012 Update of the Oklahoma Comprehensive Water Plan and presents the results of an unprecedented four-year process to develop water policy and related recommendations to address the state's current and future water issues and problems.

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Introduction

Recognizing that implementable policy decisions must be backed not only by sound science but broad public support, the OWRB in 2006 commissioned the Oklahoma Water Resources Research Institute (OWRRI) to design, oversee and implement a robust and independent four-year public participation process as the cornerstone of the 2012 OCWP Update. From the outset, the OWRB (the state agency statutorily charged with comprehensive water planning for Oklahoma) has focused foremost on an updated Water Plan that is “FIT” (Fair – Inclusive – Transparent). What resulted was an unprecedented level of openness, collaboration, and public involvement in statewide water planning.

The water policy development process yielded numerous recommendations concerning the future use, management and protection of Oklahoma’s water resources. This process relied upon an iterative combination of policy analysis and policy deliberation based upon the National Research Council’s prescription, published in 1996. The process was enormously successful in engaging Oklahoma citizens who volunteered both their time and unique perspectives in developing a well-supported, grass-roots strategy for Oklahoma’s water future. Including the final round of public input gatherings, the OWRRI has hosted about 100 local, regional, and statewide water planning meetings and engaged thousands of Oklahomans in the process. Collectively, participants have invested almost 30,000 hours so far.

Specific citizen participants were solicited and vetted by the OWRRI and approved by the OCWP Planning Advisory Board, a separate body consisting of select OWRB members and cabinet officials. For the special Water Town Hall, held in May 2010, additional citizen participants were chosen by the Oklahoma Academy for State Goals.

In all, the OCWP policy development and public input process featured five distinct phases.

In 2007, the OWRRI held 42 local input meetings (LIMs) all across the state to solicit public input on what the water plan should address. In all, 2,300 citizens attended the LIMs. The OWRRI received about 2,500 comments from the public, including issues that the citizens of Oklahoma believe warranted consideration, concerns about these issues, suggestions on potential issue resolutions, and further questions. These comments constituted the public deliberation agenda for what was to follow.

In 2008, the OWRRI hosted 11 regional input meetings (RIMs) at which participants prioritized previously developed water policy issues for consideration. OWRRI grouped the LIM comments into 54 initial categories and asked the RIM participants to weight each issue according to its appropriateness and importance for consideration in the final OCWP. All LIM participants were invited to nominate others or themselves for participation in these RIM meetings. Almost 350 citizens were invited to participate in the RIMs, assuring that all interests and geographic regions were represented. From these meetings, 10 priority water issue themes were identified. To help prepare participants for the next stage of the planning process, the OWRRI and OWRB jointly held two 1.5-day seminars to inform RIM participants and other interested citizens on water resource management issues. The first of these addressed water policy and the second addressed water science.

During the summer and fall of 2009, 30 planning workshops were convened in three sets of ten (corresponding to the 10 issue themes identified in the RIMs) held 10 weeks apart. Workshop participants were selected from among RIM participants based on their stated preferences for the issue groups in which they were interested. However, participants in each session were balanced according to stated interests and geographic distribution. In all, 240 citizens participated. Before the first session, participants were asked to review a summary of technical studies provided by CDM, the OWRB’s lead OCWP technical engineering consultant. Participants were asked to formulate alternative water resource management strategies appropriate to their theme. Experts on relevant subjects participated in

each workshop group to answer questions specific to the theme. Between the first and second session, these experts evaluated potential strategies for their technical practicability, economic efficiency, administrative feasibility for implementation, political feasibility and social acceptability. These reviews were presented to workshop participants at the beginning of the second workshop. Participants then revised the alternatives and added more detail. These revised alternatives were again evaluated between the second and third workshops. Final revisions to strategy provisions were generated during the third workshop. Altogether, the workshops produced 54 provisional OCWP strategies organized into 11 categories for further discussion.

In 2010, the OWRRI contracted with the Oklahoma Academy for State Goals to host a statewide Town Hall meeting at which 140 of the workshop participants and 32 additional Academy member participants met to reach consensus on eventual OCWP water policy recommendations. However, prior to the Town Hall, the OWRRI held a one-day water resource management strategy seminar to review workshop provisions, which helped participants prepare for the Town Hall meeting. The Town Hall meeting was conducted in six simultaneous panels consisting of less than 30 citizens each where professional facilitators led a discussion of all 11 discussion topics; each panel included an official recorder. The three-day meeting yielded 55 recommendations of which 34 received majority support among the panels; two received a split vote.

Following conclusion of the Town Hall, the OWRB and OWRRI carefully analyzed the resulting Oklahoma Academy report, including both the Final Report and Recommendations sections and distilled that information with input and feedback received during the earlier public input process. The resulting draft recommendations are provided in this report for final public consideration at the thirteen feedback and implementation meetings (FIMs) beginning April 19, 2011. These meetings, which represent the final round of statewide public input on the draft OCWP Update focusing on implementation of water policy initiatives, will be held in each of the OCWP watershed planning regions.

Complementing from the statewide input process, the OWRB also commissioned workgroups to investigate and make recommendations on several unique or particularly sensitive policy and technical issues. Furthermore, the OWRB, as the state's water management agency, offers in this report its recommendations to improve and enhance water use administration, water data for decision-making, infrastructure financing and water-related research, and address legal issues of importance.

Prioritization of Recommendations for Implementation

The OWRB believes that prioritization is essential to success of the OCWP and is required to focus limited resources on issues that require immediate attention upon conclusion of the planning process. Initial priorities were determined by public support during the input process and each recommendation's perceived urgency, feasibility and general ability to address Oklahoma's most pressing water issues and problems.

Specific discussion of implementation strategies, which will be developed from input gathered at Feedback and Implementation Meetings in April and May, will be included in the Implementation Strategies section of the final OCWP Executive Report.

OCWP Public Input Recommendations and Assessment

Priority Public Input Recommendations

Green Projects

The State should improve and encourage land management practices to help protect both water quality and quantity. This should include the implementation and development of planning tools that ensure responsible growth, development and sustainable use of resources, such as low-impact development, including green roofs, rainwater capture systems, xeriscaping and rain gardens.

ASSESSMENT: In addition to conventional wastewater projects, the OWRB's Clean Water State Revolving Fund (CWSRF) loan program also provides funds for communities to implement green infrastructure to address water quality issues, actually improve quality and reduce the detrimental impacts of stormwater runoff. Eligible projects include rain gardens, green roofs, tree boxes, swales, stormwater detention ponds, and streambank stabilization. The OWRB, through the OCWP, also administered a successful Conservation Grant Program to fund local water conservation demonstration projects; additional funding for this program is strongly encouraged. In addition, ODEQ has been working with various sustainability organizations to encourage the use of rain barrels, rain gardens, etc. And, in conjunction with stormwater regulations, many communities have adopted stormwater ponds for aesthetic features in neighborhoods and commercial developments. Finally, ODEQ has begun efforts to incorporate water reuse into regulations to enable industries, municipalities and individuals to reuse some wastewaters, including stormwater runoff.

Education is critically important for widespread acceptance of green practices. Related ongoing education programs include the OCC's Blue Thumb monitoring program and Water Quality Education group, which works to share information with the public on actions that can be taken to reduce harmful impacts to streams, rivers, lakes, wetlands and groundwater.

Tax incentives and development zoning could provide significant benefits, as would projects that mitigate green space loss and utilize wetlands for secondary and tertiary wastewater treatment.

Hydrologic Studies

The State Legislature should appropriate significant funds to enable the Oklahoma Water Resources Board to conduct and regularly update comprehensive hydrologic studies of Oklahoma's surface and groundwater resources, with priority afforded to outdated and unfunded aquifer studies.

ASSESSMENT: For groundwaters, the OWRB is required to conduct hydrologic studies of groundwater basins and determine aquifer yield and equal share of water to which each permit holder is entitled. These costly, in-depth studies are required to be updated no less than every 20 years to reflect updated hydrologic data, including that necessary to facilitate drought scenarios, and related considerations. Unfortunately, insufficient funds have been available to complete scheduled studies.

There is no statutory requirement to conduct stream water hydrologic investigations for all stream water basins in the state. However, statutes do require that when reviewing water right applications, the Water Board must determine whether there is unappropriated water available in the amount applied for. Currently, OWRB staff utilize relatively simple stream system calculations to make these determinations, although the agency is currently developing more sophisticated, albeit more costly,

water allocation models for several river systems in the state. These models offer tremendous promise in determining available water, identifying potential interference or conflicts of use, and managing resources in times of drought or other shortages.

Currently, the OWRB has no dedicated funding source to conduct such investigations and determinations. Past studies that have been based upon line-item appropriations from the Legislature, but these funds, once approved, have proven to be unreliable since appropriated amounts are inconsistent from year to year and the investigations may span several years. A reliable funding source for these studies is imperative.

Instream/Environmental Flows

Environmental flow regimes should be implemented to preserve water quality, ecological diversity and economic development, including benefits associated with recreation, hunting and fishing.

ASSESSMENT: A forum for the future discussion of the issue of flow protection for instream uses – including water supply, fish and wildlife and recreation – is addressed in the 2012 OCWP Update. A specific Instream Flow Workgroup was commissioned to investigate the subject. While an instream flow program is not necessarily recommended at this time, its suitability for Oklahoma should be aggressively investigated through the process outlined in the OCWP Instream Flow Workgroup's report. As a part of the process to evaluate and develop a potential instream flow program, the OWRB should seek express authority from the State Legislature prior to promulgating rules on instream flows so that the state can maintain at least an arguable position that it should retain control over its water resources instead of ceding authority to the courts.

Interstate Water Issues

The Oklahoma Water Resources Board should investigate development of an interstate groundwater compact between Texas, Oklahoma, Kansas and Nebraska as a forum to initiate meaningful dialogue concerning the future use and status of the Ogallala aquifer.

ASSESSMENT: In the late 1990s, the Western States Water Council, an independent arm of the Western Governors Association, formed a High Plains Subcommittee to explore the potential interest of regional states to negotiate a compact involving groundwater use from the Ogallala Aquifer. There was insufficient mutual interest to pursue compact development, perhaps due to private property concerns and related issues concerning “takings” and landowner compensation. However, despite the absence of an Ogallala compact, states have cooperated on historic studies of the aquifer, such as the High Plains Aquifer Study in the 1980s, a Bureau of Reclamation investigation involving eight states that overlie parts of the aquifer.

A “compact” is a formal binding agreement between or among states. Under the U.S. Constitution, Congress must approve such a compact for it to become effective, particularly if any federal rights may be impacted. Other less binding alternatives also exist. A non-binding cooperative agreement to address the Ogallala and other aquifers that underlie part of Oklahoma and other states could encourage the sharing of monitoring data and information. In view of the number of states involved in the Ogallala Aquifer, negotiating a non-binding agreement will require dedication of funding by the states, then continued funding to carry out the activities addressed by the cooperative agreement.

Local & Statewide Water Planning

The State Legislature should enact legislation to create thirteen Regional Advisory Groups charged with identifying local water resource issues and developing action plans and recommendations for implementation by the Oklahoma Water Resources Board.

ASSESSMENT: The OWRB should work with the State Legislature to establish thirteen Regional Advisory Groups, watershed-based coalitions based upon OCWP watershed planning regions that contain diverse stakeholder representation, including citizens, local, state, tribal and federal authorities, and non-governmental organizations. These groups would collaborate and coordinate on water resource issues in their regions, identify regional priorities and common issues facing water users, and seek appropriate funding opportunities to address issues and needs. The OWRB would coordinate group activities, provide available technical and financial assistance, and coordinate administrative support. It is not recommended that these groups have any direct regulatory responsibilities. Implementation should be coordinated through either the Governor's cabinet or OWRB, working with multiple state agencies.

The State Legislature should establish a permanent dedicated source of funding to comprehensively address Oklahoma's water needs through statewide water planning and evaluation.

ASSESSMENT: The state's current gross production tax allocation is an appropriate source of dedicated, continuous funding for implementing OCWP and related priority planning initiatives. Removal of the cap on funding should be strongly considered to more aggressively implement required water planning projects and strategies.

The State should create a competitive grant program for the thirteen Oklahoma Comprehensive Water Plan watershed planning regions to demonstrate "best practices" that result in the improvement of state water quality and water supplies.

ASSESSMENT: The widespread use of best management practices, which incorporate the spirit and practice of the OCWP, is now only limited by resources. The state currently funds implementation of best practices to address water quality and quantity concerns through federally-funded programs, such as U.S. Department of Agriculture (USDA) Farm Bill Conservation Programs (EQIP, CRP, CREP, WRP, etc), CWA 319 and State Revolving Fund (SRF) programs. The state also contributes state funds to these practices through the OCC's locally-led and priority watershed cost-share programs. A new state competitive grant program, or expansion of existing programs, would allow limited financial resources to be applied in those areas possessing the greatest likelihood of success and potential. The state is a national leader in the successful implementation of BMPs and possesses proven research expertise. This recommendation has been incorporated as one of the responsibilities of the proposed Regional Advisory Groups.

The OWRB should investigate measures to further implement and develop the Oklahoma H2O planning tool as part of a regular method to dynamically forecast local and regional water supply and demand with a focus on balancing economic and environmental considerations.

ASSESSMENT: The OWRB should work with the State Legislature to draft legislation requiring the agency to form a permanent committee of appropriate state and federal agencies and stakeholders to coordinate implementation of the plan consistent with current and future OCWP initiatives. The committee would review and provide input on forecasting methodologies; assess continued use of the Oklahoma H2O model and/or other water planning and forecasting models; and assess and address

required data gaps. The committee should include and/or involve scientists and economists from diverse fields to determine the accuracy and appropriateness of data and oversee the use of Geographic Information Systems in linking water demand and availability over time and area.

Regionalization of Water Supply Systems

The State should develop a comprehensive, pro-active plan to incentivize the interconnection and shared storage of water between or within local, regional and state water systems. The State should also evaluate risks associated with various types of water emergencies and encourage local entities to incorporate similar measures through incentives and technical assistance.

ASSESSMENT: Water supply systems should be regionalized wherever appropriate to maximize associated costs and services. However, the extent to which regionalization should occur is largely a local decision dependent upon a variety of factors that will vary from system to system. Through the Drinking Water State Revolving Fund (DWSRF) loan program, the OWRB and ODEQ have already begun to encourage consolidation and system cooperation through principal forgiveness incentives. The State should initiate a comprehensive plan to evaluate systems and recommend system regionalization opportunities, including incentives to encourage shared connections and infrastructure. An adequate funding source will also be required to implement a more robust regionalization program.

Reservoir Maintenance & Development

The Oklahoma Conservation Commission, Oklahoma Water Resources Board and other appropriate agencies should work collaboratively to develop a cooperative process to maximize the flood control, water supply and related benefits of existing flood control lake projects as well as identify the potential viability of those designated for construction in the state. Both state and federal funds should be used to improve existing lakes or build future projects.

ASSESSMENT: The OCC, OWRB, Natural Resources Conservation Service and other appropriate local, state and federal agencies should work collaboratively with local sponsors to build flood control dams currently designated for construction and establish additional water supply sources wherever practical. In addition to new dams, the rehabilitation of existing dams, including the addition of water for consumptive use, should be an integral initiative of the OCWP, which should institute a process to identify the most beneficial and appropriate sites for repairs, rehabilitation, new construction and long-term operation and maintenance. Because adequate funding is essential to maintain the level of protection these dams have provided for the last 60 years, the OWRB, OCC and others involved in the site evaluation process should also assess available sources of federal funding, such as through the U.S. Army Corps of Engineers, or other potential sources of cost-share funds.

State-Tribal Water Issues

The State of Oklahoma should continue planning dialogue, in advance of a formal consultation process, with representatives of Oklahoma's Tribal Nations to proactively address concerns over mutual water issues. Collaboration should be instituted through a watershed approach.

ASSESSMENT: The Oklahoma Governor and State Legislature should consider recommendations included in the Report on Tribal Issues and Concerns, included in the OCWP's Executive Report.

Surface/Groundwater Interaction

The Oklahoma Water Resources Board should conduct a comprehensive hydrologic evaluation of priority stream and alluvial water systems statewide with a focus on the interactions between local surface and groundwaters as well as stream maintenance requirements. Resulting evaluations and studies should be updated at least every twenty years.

ASSESSMENT: Recognizing the significant interaction between certain surface and groundwater systems in Oklahoma, future hydrologic studies should include a regular procedure to prioritize study areas for analysis and potential implementation of a conjunctive scheme of water resource management. However, decisions related to implementation of any conjunctive management scheme should be subject to recommendations of a working group of stakeholders charged with determining the applicability of such a system and framing appropriate policy. If a conjunctive management system is warranted, the State Legislature should provide consistent funding for surface/groundwater interaction studies, including the development of appropriate hydrologic models.

Water Conservation

The State should promote water conservation through the use of incentives – such as tax credits, cost-share programs, and utilization of the increasing block rate water pricing mechanism – as well as through improved irrigation and farming techniques, control of invasive species and the use of marginal quality waters (including treated gray and waste water).

ASSESSMENT: The use of appropriate water conservation practices by water users is strongly encouraged. Public water supply conservation initiatives are best implemented at the local level. As part of the OCWP's technical analysis, a variety of conservation scenarios were applied to projected municipal/industrial and irrigation water use to demonstrate how these measures could reduce demand.

The OWRB's Financial Assistance Grant Program offers incentives for the employment of conservation-based water pricing structures. In addition, the OWRB (through the OCWP) administered a Conservation Grant Program for local water conservation demonstration projects, which was highly successful. Further funding of this program is strongly encouraged. The OCWP also supports research to investigate local conservation practices and their implementation.

Specific to irrigation, ongoing USDA conservation programs in Oklahoma, such as the Environmental Quality Incentives Program, devote significant funding to improving irrigation efficiencies and controlling invasive species (such as through red cedar eradication). Conservation tillage is also a focus of these programs. However, funding for these programs can't keep up with the need and additional resources will be required, especially through tax incentives and cost-share assistance. Communities must develop fire-wise plans and provide education on brush control. The use of water-efficient plants on cropland not only reduces water use, but increases drought tolerance. More research is required on how no-till and crop rotation practices impact the water balance so that incentives are appropriately designed. While Oklahoma is making significant investments toward increased agricultural conservation through current programs, funding constraints somewhat limit their effectiveness. Tax incentives for brush control and conversion, along with cost-share programs, will help.

Water Education

The State Legislature should dedicate appropriate funding to implement a comprehensive water-related education program in public and private school systems. State funding should also be increased for water research and development at the local, regional and state level.

ASSESSMENT: Although, historically, only limited state resources have been devoted toward water and conservation education, as well as research, a comprehensive education program would provide enormous benefits in getting citizens to recognize the importance and benefits of conservation, understand the use and value of water, and change behavior regarding natural resources. Current environmental education programs through the Oklahoma Department of Environmental Quality (ODEQ), Oklahoma Conservation Commission (OCC), Oklahoma Department of Wildlife Conservation (ODWC) and other agencies provide excellent training resources and materials for Oklahoma educators and the general public on water-related subjects. Collectively, these agencies could serve as a clearing house for water education and information with an emphasis on water resource sustainability. Initially, a workgroup, including public and private entities as well as individual citizens, could be formed to develop a comprehensive state water education plan that focuses on primary, secondary, and higher education.

The Oklahoma Water Resources Board should establish a website or another suitable mechanism to serve as a central contact point for water information, education and related resources.

ASSESSMENT: Oklahoma requires a central “water portal” website to serve as a central comprehensive source for state and federal water-related data and information on programs, agency water-related statutory responsibilities and jurisdictions, public education and resources. Development of the portal should be coordinated by the OWRB with support from appropriate cabinet secretaries and state and federal agencies.

Water Emergency/Drought Planning

The Oklahoma Drought Management Plan should be updated and expanded to specifically address water emergencies – including an assessment of causes, impacts and capabilities – as well as improve state, federal and local response to flooding, terrorism and water contamination.

ASSESSMENT: The Oklahoma Drought Management Plan, originally written in 1997, requires an update to reflect current lines of authority and responsibility that impact how water systems, cities, counties, and state and federal agencies respond to drought, including the latest procedures addressing state or federal assistance. The plan should also be expanded to specifically address the causes, impacts and response to general water emergencies.

The Oklahoma Department of Emergency Management should coordinate the update utilizing a workgroup consisting of agencies and stakeholders. Ensuring consistency with the state’s existing Standard Hazard Mitigation Plan, the workgroup should expand the existing plan to other water-related emergencies, recognize local control, ensure protection for water providers and purchasers from liability and price-gouging, and require the ready availability of backup generators for emergency use. The workgroup should also consider renaming the new plan the “Oklahoma Water Emergency and Drought Management Plan.”

Water Quality/Quantity Monitoring

The State Legislature should provide a dedicated source of funding to support permanent statewide water quality and quantity monitoring programs.

ASSESSMENT: The state possesses several water monitoring programs, such as the OWRB’s Beneficial Use Monitoring Program and U.S. Geological Survey’s Cooperative Stream Gaging Program, but most lack sufficient funds to provide the comprehensive assessment necessary to ensure sustainable water

resource management. Numerous new programs, including a comprehensive groundwater quality and quantity monitoring effort, have been suggested by both the public and state agencies to provide the data required to make informed water management decisions on behalf of water users across the state.

Additional Public Input Recommendations

Nonpoint Source Pollution

Voluntary water management practices should be encouraged for agricultural lands, urban storm water, and suburban developments. These voluntary management practices should include cost sharing or incentives funded through the appropriate state agency(s).

ASSESSMENT: The OCC, working with the USDA, EPA and other state, federal and local partners, implements farm bill conservation programs and the CWA Section 319 program to promote and demonstrate voluntary best management practices to minimize pollution and protect surface and groundwater resources. These highly successful programs have documented success; however, funding limits widespread implementation. The voluntary approach is always best and can be implemented through education, tax incentives and cost-share assistance. Specific to cities, if the problem is severe enough, more zoning and requirements will be necessary. The OCWP Marginal Quality Water report identifies sources of stormwater runoff and its potential beneficial use as well as general recommendations on this issue.

The Oklahoma Conservation Commission should emphasize roadside erosion and resulting sediment as a major contributor to water quality degradation. The OCC or other appropriate agencies should work with county commissioners to improve or fund proper construction and maintenance of roads to reduce sediment contribution.

ASSESSMENT: In some watersheds, roadside erosion can be a significant contributor to sediment loading downstream. When funding is available, OCC has worked with county commissioners, foresters, and others to implement practices to reduce this erosion. To maximize limited resources for this important effort, it will be prudent to prioritize areas where roadside erosion controls could have the greatest benefit on water quality, and then pursue outreach to the Association of County Commissioners in tandem with efforts to institute prescribed fire for cedar control (burn ban issues). The amount of funds necessary to correct these erosion problems is significant.

The Oklahoma Conservation Commission and other appropriate agencies should create or enhance programs that promote water quality improvements through land use management and the protection of wetlands and riparian zones.

ASSESSMENT: Both the Environmental Protection Agency and State of Oklahoma (through the OCC) work diligently through the Clean Water Act Section 319 program to address non-point source impacts related to land use and water quality. Through 319 demonstration projects and promotion of best management practices in both the rural and urban environments, Oklahoma is working to maintain and protect water quality. The effectiveness of these programs depends on continued funding.

Interagency Coordination

The State should create a formal interagency water resources committee to foster improved coordination and communication between state and federal water resource agencies as well as inform and work cooperatively with the public.

ASSESSMENT: Existing coordination among state water agencies is facilitated through Oklahoma's cabinet secretaries in addition to numerous interagency water resource-related committees required by statutes, such as workgroups that regularly meet to coordinate on water quality standards, total maximum daily loads, integrated water quality reporting, and non-point source issues. The Office of the Secretary of Environment could investigate the feasibility of a broader interagency workgroup to implement this recommendation, perhaps based upon the Funding Agency Coordinating Team model and involving all agencies with water resources jurisdiction using existing agency personnel.

An interagency water resources committee could also advance collaboration with federal water agencies, including funding for various water resource projects and initiatives. The leveraging of multiple federal agency resources to provide collaborative assistance could be modeled after the existing Western States Water Council Western States Federal Agency Support Team (WestFAST) process. In addition to leveraging the resources of multiple federal agencies, this type of process could identify national programs, such as the National Integrated Drought Information System, to help advance efforts to assure long-term sustainable water resources for Oklahoma.

Interstate Water Issues

The State should explore the creation of standing planning committees through existing interstate stream water compacts or other federal/state forums to work proactively with neighboring states on shared water resource management issues and thus limit potential interstate conflicts and litigation.

ASSESSMENT: Several existing forums or mechanisms – including four interstate stream compacts and state and federal participation in annual meetings of the Arkansas-White-Red Basin Inter-agency Committee – could be utilized to further address interstate conflicts over shared waters. The U.S. Geological Survey's stream gaging program provides an excellent source of annual surface flow data to accurately monitor and apportion waters.

Formalizing discussion of water planning issues and projects, both state and federal, would not only help to proactively avoid potential conflicts and litigation, but facilitate collaboration on mutually beneficial initiatives. Creation of standing water planning committees as advisory bodies would require additional state agency staff time and resources. The OWRB, which provides administrative support for Oklahoma's compact commissioners, historically receives no specific appropriations for that duty.

Interstate Water Sales

Oklahoma's share of proceeds from any potential interstate water sale should be allocated to a legislatively-created trust or authority with members appointed by the Governor and approved by the Senate. The use of such proceeds would be specifically limited to use for required water infrastructure projects and water studies consistent with Oklahoma Comprehensive Water Plan initiatives. These funds should not reduce the state's general appropriations for water projects.

ASSESSMENT: The use of potential interstate water sale proceeds would be under the purview of the Governor's office and State Legislature.

Local & Statewide Water Planning

The State should encourage public water policy that enables informed decision-making through incentives and funding for planning and technical assistance, regional collaboration and education.

ASSESSMENT: OCWP Watershed Planning Region Reports were developed to assist water providers in planning for their future water needs, including identification of alternative supply sources. These reports, including the OCWP Oklahoma H2O planning model, represent an extremely valuable planning resource to facilitate local water needs. Through Regional Advisory Groups, the OWRB could incentivize effective regional collaboration by creating or modifying a program – perhaps utilizing gross production tax proceeds – to fund projects of merit endorsed by regional stakeholders.

Each ten-year update of the Oklahoma Comprehensive Water Plan should utilize a Town Hall or similar forum to review, discuss and frame proposed water policy for the state as well as the Governor's Water Conference to facilitate the exchange of more general information concerning Oklahoma Comprehensive Water Plan development and implementation.

ASSESSMENT: The key to successful statewide planning effort is robust public participation. The Town Hall process, moderated by the Oklahoma Academy for State Goals, demonstrated its value to the public input process during the 2012 OCWP Update and should be considered for use in development of future water plans. Similarly, the Governor's Water Conference has been and should continue to be an open forum for discussion during the development and implementation of this and future water plans.

The Oklahoma Comprehensive Water Plan's Oklahoma H2O model should be developed for widespread implementation, facilitated through Geographic Information System technology, as the preferred local and statewide water planning tool.

ASSESSMENT: The Oklahoma H2O tool was used extensively to develop the technical analyses and results presented in the OCWP's Watershed Planning Region Reports, including associated basin reports. Continued development and implementation of this GIS-based computer model is encouraged and resulting data should be made commonly accessible to the public through the OWRB's website. In addition, Oklahoma H2O should be utilized to assess recommendations provided by the OCWP Instream Flow Study Workgroup.

Source Water Protection

The State – through the Oklahoma Department of Environmental Quality, Oklahoma Water Resources Board and/or Oklahoma Conservation Commission – should provide technical assistance to public water systems for the development of source water and wellhead protection plans that reduce the threat of pollution to public water supplies.

ASSESSMENT: Avoiding pollution is much more cost-effective than mitigating resulting impacts. The OCC develops watershed protection and restoration plans to identify potential pollution sources in the watershed of water supply reservoirs and works with local landowners to minimize associated impacts. The ODEQ currently works with water providers to assure upstream water quality protection and it implements a wellhead protection program to protect groundwater. The OWRB protects water supplies through the Water Quality Standards (WQS) by limiting new pollution sources or increased loads from existing sources upstream of Sensitive Water Supplies. The WQS also identify aquifers with a high potential for contamination from surface sources to promote the proper siting and managing of potential surface contaminates.

Water Conservation

The State should establish incentives – such as tax credits and a cost-sharing program – to encourage conservation-conscious infrastructure, including the incremental retrofitting of existing buildings and integration of water recycling/reuse systems in new buildings.

ASSESSMENT: Existing EPA regulations and programs address the establishment of conservation infrastructure through retrofitting and/or new construction. This can also be accomplished through local building codes. Many agencies and universities utilize related standards that can be used as a resource in developing local guidelines. Regardless, it would be wise to pursue such measures in advance of mandated regulations.

A statewide process should be developed and implemented to evaluate the augmentation of water supplies through programs to manage invasive plant species, increase water filtration and reduce runoff.

ASSESSMENT: Current programs to eliminate eastern red cedar, salt cedar and other invasive species may also positively impact the water balance. Similar benefits could also be realized by increasing water filtration rates and reducing runoff through the addition of soil organic matter and land contouring. There is a need to further investigate these efforts and their potential to augment water supplies. Eventual widespread programs will require a coordinated approach involving private property owners, local communities, and county, state and federal partners. Tax incentives, cost-share programs and technical assistance will be vital to eventual success.

The State should encourage local water providers to implement water pricing measures through appropriate and realistic tiered rate, market-based pricing mechanisms.

ASSESSMENT: There is significant support for a water pricing structure that supports sustainable infrastructure and supply. However, such decisions are most effective at the local level. Water providers, supported by the state, should work diligently to educate consumers on the true cost of reliable water supply. EPA's WaterSense program possesses numerous tools that water providers can use to discourage the wasteful use of water.

All appropriate state and federal lending agencies should adjust program eligibility requirements so that applicants for public water and wastewater financing are required to identify, report, mitigate and monitor system water losses. The State Legislature should also investigate the creation and funding of a state program that offers grants and loans to eligible water systems in Oklahoma for water system leak detection.

ASSESSMENT: Assorted loan and grant programs currently offer limited financial assistance to help water systems conduct leak surveys or purchase equipment. In particular, Rural Economic Action Plan funds target such projects specifically for small systems. In addition, the Oklahoma Rural Water Association currently offers technical assistance for performing water audits and leak detection services. There is support to tie state infrastructure financing eligibility with requirements of public water and wastewater entities to identify and report system water losses. Due to associated expenses, it may be prudent for a statewide entity, such as ORWA, to purchase and house monitoring and detection equipment. There is also support for funding that could assist especially small entities in obtaining or purchasing their own monitoring equipment.

Water Dispute Resolution

The Oklahoma Water Resources Board and other appropriate state agencies should establish a formal alternative dispute resolution program that assists parties in resolving ongoing or potential water-related disputes.

ASSESSMENT: In 1994, the OWRB was given statutory authority to facilitate and mediate disputes, but only between municipalities and rural water districts, and only regarding water contracts and service areas or territories. If funding from the Legislature or another source can be secured, a statute similar to that creating the Oklahoma Agriculture Mediation Program could be enacted to authorize and implement a more formal mediation program designed to encourage settlement of water disputes of all kinds and between any parties before adjudication of the dispute by the administrative agencies, such as the OWRB or courts. A voluntary mediation services modeled after the Oklahoma Agriculture Mediation Program would provide an effective alternative to court action in working to settle disputes between landowners, landowners and state agencies or other water related interests, such as "basin shareholders." If the conflict cannot be resolved through mediation, the next step would be an administrative hearing held before the agency having jurisdiction. This program, or the administrative hearing, would not preclude a party from filing suit if the process produces unsatisfactory results.

Alternate Dispute Resolution includes at least three levels of alternatives to a lawsuit to address or resolve a dispute, from the less formal to more formal: (1) facilitation, where the facilitator provides a forum where disputing parties can discuss issues and potential resolutions face-to-face; (2) mediation, where an informed and qualified neutral mediator is usually compensated by the parties to critique each party's position, caucus separately with each side, and suggest resolution of the matter, and (3) arbitration, often agreed to in advance, where a jointly-selected neutral arbitrator is paid to review information that would otherwise be considered evidence in court and make binding decisions based upon the law.

Water Emergency/Drought Planning

The Oklahoma Comprehensive Water Plan should include a transparent process for regional prioritization of water uses during each type or category of emergency. The plan should identify, inventory, categorize and specifically prioritize appropriate emergency water supplies.

ASSESSMENT: In Oklahoma, a water use preference statute that applies to existing rights could be extremely difficult to impose for use of groundwater due to associated private property claims that could be asserted by landowners. Regarding the use of stream water in Oklahoma, a preference statute would create an exception to the fundamental appropriation principle that priority in time gives the better right. If a preference law was imposed on existing rights, an argument could be made that it would constitute a taking and may subject the preferred user to a just compensation claim. However, it could be argued that if the preference was implemented only in times of emergency declared by the Governor, a private property takings claim can be avoided through the limited exercise of police power to address a public disaster. On the local level, most communities already possess some authority to restrict certain uses during times of emergency, which could constitute prioritization of uses.

Enforcement of preferences, whether at the local or state level, is a separate but important issue and would require an analysis of potential costs. Enforcement activities could include receipt of complaints, field inspections, notice to lower preference uses of the need to discontinue diversions even if the lower preference use has a senior priority, and possible court action to assist compliance. Significant funding would be required to implement such a program.

The Oklahoma Department of Environmental Quality should include a water and wastewater emergency planning component in its municipality water system operator training program.

ASSESSMENT: This is a Town Hall recommendation supported by both ODEQ and the OWRB. The ODEQ has stated that it will attempt to incorporate emergency planning into the Operator Certification Program, contingent upon current budget limitations.

Water Infrastructure Development

Water systems should be required to utilize minimum water/wastewater infrastructure pipeline sizes based on future needs associated with projected population growth, economic development initiatives and improved fire protection.

ASSESSMENT: ODEQ rules require specific pipeline sizes in order to allow for fire protection. Historically, however, funding requirements have not considered minimum pipeline requirements for rehabilitation or new projects.

Water Sales & Transfers

The State should initiate comprehensive basin analyses to identify and quantify surplus water resources in the state. These studies, which should be conducted in advance of any formal out-of-state water transfer discussions, should consider and address downstream interests, interstate compact requirements, intrastate needs, conservation requirements for the receiving state, regional and basin-based economic impact and development of best management practices. This water development should place a priority on economic and community growth in Oklahoma.

ASSESSMENT: Thorough analyses of surplus water are required prior to the State making any decisions concerning out-of-state water transfers. The OCWP provides a wealth of information to address this issue. Specifically, OCWP technical reports include detailed analyses of future water supply and demand on both a local (basin) and regional level. Supply is inventoried according to physical availability, permit availability and water quality considerations and options are suggested to deal with projected shortages, including basin-to-basin transfers. In addition, HB 1483, passed during the 2009 legislative session, established specific provisions to address many of the items listed in this recommendation.

Regarding a definition of surplus water, the 1974 OCWP law specifies that the plan shall include a definition of “excess and surplus water of this state” and a recommended procedure for determining “excess and surplus water of this state... to ensure that the area of origin will never be made water deficient.” Phase 1 of the original OCWP, which offered a detailed plan and interconnected system to move this excess and surplus water from the southeast to central and southwest Oklahoma, also included the required definition of “excess and surplus water,” as follows: “that amount which would not result in deprival of a prior right to water to any inhabitant or property owner within a major drainage system wherein water originates. Methodology as used for study purposes herein considers such prior right to extend for the ensuing 50 years.” The final 1980 OCWP contained a section that discussed the concepts of “area of origin protection” and “excess and surplus water” together, noting the concept of “area of origin protection” is found in the state’s stream water law. The 1980 plan went on to say that the OWRB defines “excess or surplus water” to mean the amount of water which is greater than the existing or reasonably foreseeable requirements needed to satisfy all beneficial uses within an area or origin.” In that context, reasonably foreseeable means a 50-year period because that was and remains the accepted planning horizon in forecasting population and water requirements. [The OCWP Executive Report contains specific discussion on this issue.]

The Oklahoma Water Resources Board should institute a provision that requires recipients of an intra- or interstate water transfer to develop and submit a water conservation plan that protects the basin of origin, especially during times of drought or other water emergencies.

ASSESSMENT: Requiring an out-of-basin user to establish and follow a general “water conservation plan” may be insufficient to protect basins-of-origin during water emergencies. To be most effective, it may also be necessary to require direct and specific conditions, such as limitations on flow or pumping, concerning water use.

Ultimately, area-of-origin protection for droughts and emergencies can be provided in appropriation permits by (1) existing statutes, (2) existing OWRB rules, (3) and “plenary authority” of the OWRB to condition appropriations by flow, time and lake level provisions. In addition, if Oklahoma enters some contract for the use of water out-of-state, such a contract would likely contain conditions, limitations and restrictions for area-of-origin protection. [The OCWP Executive Report contains specific discussion on this issue.]

Water Supply Augmentation

The Oklahoma Water Resources Board should investigate measures to utilize unconventional water sources – such as brackish or other marginal quality waters, stormwater runoff, or water produced through artificial aquifer recharge – for widespread beneficial use.

ASSESSMENT: In 2008, the Oklahoma Legislature passed separate legislation requiring the OWRB to establish technical workgroups to: 1) analyze the potential for expanded use of marginal quality water throughout Oklahoma; and 2) develop criteria to prioritize groundwater recharge projects and recommend feasible artificial recharge demonstration projects. Technical studies conducted during the course of the current OCWP update indicated that projected water supply gaps could be alleviated by traditional water supply methods. However, in light of current information gaps as well as inherent uncertainties in projecting demands and assessing available supplies for such a lengthy timeframe, it is prudent to investigate and identify alternatives. A summary of the findings and recommendations for future opportunities to implement marginal quality water and recharge programs are contained in the OCWP Executive Report.

Water Use Permitting

The use of mining (pit) water, as well as associated monitoring, should be subject to the Oklahoma Water Resources Board’s water rights administration procedures.

ASSESSMENT: Legislation and rules pertaining to the use of water in open pit mining operations are currently under negotiation involving representatives of pertinent stakeholders.

OCWP Workgroup & Agency Recommendations

Agricultural Water Research Needs & Opportunities

The following assessment was submitted by the Division of Agriculture Sciences and Natural Resources at Oklahoma State University with input from various statewide agricultural commodity groups as well as the Oklahoma Department of Agriculture Food and Forestry. ODAFF was commissioned by the OWB to coordinate this OCWP study of current and future water issues associated with the agricultural industry in Oklahoma and to make recommendations regarding future actions necessary to assist in addressing those issues. This study summarizes conclusions and opportunities for future work.

A review of the evolution of agriculture in Oklahoma clearly supports the premise that water access has been and will continue to be essential to the success of agriculture and to the future of the state's economy. It is a simple fact that water access is pure potential—access translates into economic opportunity for agriculture. Therefore, economic consequences of reduced access should be recognized by addressing how changes in water law arising from the Comprehensive Water Plan will affect pricing and access to current and potential users.

The following questions highlight some of the more fertile research and extension-educational needs and opportunities that can address this issue and other issues related to water and agriculture as the Comprehensive Water Plan is implemented and before the next water plan is constructed.

- What is the annual water balance for each of the state's gauged watersheds including the fraction of precipitation diverted to runoff and to groundwater recharge in each watershed and the efficiency of precipitation use?
- What is the influence of farmland management, irrigation, and conservation practices on rainfall partitioning and water production of Oklahoma watersheds?
- How will changes in land use (e.g., no-till crop production, bioenergy feedstock production) and land cover (e.g., ex-urban and urban expansion, eastern red cedar encroachment) influence the hydrology of watersheds across the state?
- How will climate change/climate variability and the interaction with change in land use and land cover influence the state's water balance?
- How can Cooperative Extension programming be developed and delivered to assist ranchers, farmers, other landowners, and rural communities to adopt management practices that will increase resiliency and reduce vulnerability to climate variability including drought?
- How might change in production, market and regulatory environments (e.g., dust control mandates that require water use) influence water demand in agriculture including the livestock sector?
- What horticultural, household, and community practices can be phased in over time to reduce statewide water consumption and improve water quality?
- How can reservoir pools and in-stream flows be optimized to minimize use conflicts and optimize benefits to all interests (i.e., aquatic ecosystem integrity, municipal water supply, and power generation)?
- Assuming exurban development continues and in the form of small acreages and ranchettes, to what extent will it influence ground water use, especially riparian water use through demand created by large, irrigated gardens and other domestic-use demands for water as allowed in the current statute?

- How might robust modeling of alternative scenarios be used to predict supply and demand to better anticipate change? Alternative scenarios should include, for example, climate variation, variable price of commodities and input costs including cost of irrigation, change in government policy, expanded commodity markets, change in water demand driven by land-use and land-cover change, and technology innovation adoption by farmers and ranchers to reduce water use.

Climate Water Policy Recommendations

The following report was developed for the 2012 Update of the Oklahoma Comprehensive Water Plan to address Oklahoma climate issues as they relate to water management. This analysis, conducted by the Oklahoma Climatological Survey, details the anticipated climate-related water management challenges facing the state and offers recommendations for future related research and development.

Recommendations for Future Research and Development

Funding for the following recommendations can be developed through a combination of permanent state funding for the Oklahoma Climatological Survey, project-based funding via research grants and contracts from external agencies (e.g., National Science Foundation; U.S. Departments of Agriculture, Energy, and Interior; National Oceanic and Atmospheric Administration), and stable funding provided by water or energy users via a small increase in water permit fees or monthly surcharge on electrical bills.

1. Oklahoma should assess the characteristics of, variability of, and trends in moisture and temperature over a range of spatial and temporal scales and use this information to enhance and validate regional climate projections from seasonal to decadal time scales

The complexity of Oklahoma's water environment results, in part, from the type of precipitation that occurs across our state. Much of Oklahoma's precipitation is convective in nature, resulting in isolated thunderstorms, lines or complexes of multiple thunderstorms, and embedded thunderstorms in winter low-pressure systems. These convective events result in river floods, flash floods, significant ice storms, and the occasional blizzard. On the other end of the water-supply spectrum are seasonal to multi-year droughts. Better physical understanding of these events (e.g., how are precipitation conditions related to El Niño and La Niña?, what conditions led to more devastating ice storms in the decade of the 2000s than any previous decade since statehood?) is critical to knowing how our water environment will change in the future.

Additional research is needed on the characteristics of, variability of, and trends in moisture and temperature over a range of spatial and temporal scales. This information can be used to enhance the physical mechanisms depicted in regional climate models and to validate the results of both high-resolution and "downscaled" global climate models for the goal of providing decision makers the best projections possible for resource management and infrastructure decisions. In addition, the water demands for each watershed, whether from ecosystem services, residential usage, agriculture, energy development, or other need, needs to be assessed at a variety of temporal scales to determine the resiliency of the system to sudden or slow changes in "normal" precipitation. This knowledge results from learning how individuals, organizations, and communities prioritize water usage and what conditions trigger them to conserve water.

2. Oklahoma should develop and improve predictive water management tools

Even without the population growth, climate change, and land use changes that are projected in the future, Oklahoma water resource managers are plagued by too few tools that display current

supply and demand, near-term and long-term projections in precipitation, and comparison with past water years. It is difficult to manage risk without sufficient information and tools.

Water resources management is governed by the interrelationships between the weather and climate system, natural and engineered water systems, and water use decisions. Understanding the variability and trends of our past water budget (e.g., precipitation, evaporation, soil moisture fluxes, groundwater recharge, runoff) and the use of global climate models is only a first step. A similar effort is needed to assess trends and variability in water demand at local and regional scales. What are the primary drivers behind increasing water use or conservation? How do economics (i.e., the cost of providing water) affect individual judgments on conservation? How can other factors, such as aesthetic qualities (e.g., lakes, green vegetation), be valued and how do they affect our water use decisions? How are changes in the natural ecosystems affecting water demand, such as expansive spread of eastern red cedars? How does new technology affect water use (e.g., expanded use of dishwashers)?

Once identified, these factors can be coupled into a decision-support model that allows community planners and water district managers to alter one or more of the inputs to see how the system responds. This tool will give local planners an ability to determine options that preserve local supplies at the lowest possible cost and maintain community quality that residents deem important. Tools such as WaterSim, developed by Arizona State University, are a start in this direction, allowing water managers to adjust factors such as climate change, drought, population growth, technological innovation, land use, and policy decisions. But these are designed for large urban areas on highly managed water systems like the Colorado River. Oklahoma could become a leader in developing a tool that works for small, rural communities that rely primarily upon local lakes, streams, and reservoirs.

3. Oklahoma should measure and account for its water

Currently, Oklahoma is the most comprehensively observed state in the U.S. with respect to water in both the atmosphere and near-surface soil layer. Our observing capabilities provide us high potential to conduct a comprehensive, statewide “water census” on the monthly, seasonal, and annual time scales. Maintaining a strong infrastructure of the Oklahoma Mesonet, in combination with federal resources such as the Doppler radar network, is critical for accounting for water supply, especially through extremes in our climate. Some water elements, especially on the watershed level, need to be better measured or estimated and others that may be measured well by remote sensing technologies may require further validation of algorithms. Many of these additional elements can be funded through research grants, but funding for the Oklahoma Mesonet necessitates the permanent base funding by the Oklahoma Legislature (through the Oklahoma State Regents for Higher Education), with annual cost-of-living adjustments. Without this stable funding, the Oklahoma Mesonet cannot provide the water resource management, operations, education, and research communities with the observations needed to conduct business efficiently and effectively.

Instream Flow Workgroup Recommendations

The following recommendations were submitted by the OCWP Instream Flow Workgroup consisting of individuals representing industry, municipalities, agriculture, oil and gas, environmental groups, tribes and federal and state agencies in Oklahoma. These individuals were asked to reach consensus concerning the steps necessary to continue dialogue on the potential establishment of an instream flow program in Oklahoma. These recommendations, developed specifically for the

2012 Update of the Oklahoma Comprehensive Water Plan to address Oklahoma's instream flow issues, are also included in the OCWP Instream Flow Workgroup Report.

The instream flow Advisory Group met as a committee five times over the course of this project and communication between members also occurred via email and conference calls. The meetings were facilitated by an independent consultant (Barney Austin with INTERA) and typically included a presentation on some aspect of instream flow or water resources the Advisory Group was interested in (such as legal considerations in Oklahoma, desktop methodologies for instream flow studies, the domestic use set-aside and economic benefits of streams and reservoirs), followed by a dialog on how, or if, Oklahoma should address instream flows. While significant progress was made in understanding the complexities and challenges that would need to be addressed prior to implementing instream flow policies within the legal framework for water resources management in Oklahoma, several issues remain not fully resolved or poorly understood. For example, some of the Advisory Group members suggested that the domestic use set-aside or other mechanisms may provide sufficient protection for instream flow needs now and in the future. Others expressed concern that the financial resources required to conduct instream flow studies would be better spent elsewhere and that the impact of the implementation of an instream flow standard for a particular basin may have unintended economic consequences. On the other hand, some members expressed frustration on the lack of progress in dealing with instream flows to protect the environment and endangered species in Oklahoma. These discussions helped form the basis of this report.

Some of the recommendations presented below are technical in nature, while others clearly fall within the realm of policy. The Advisory Group discussed at length whether the policy questions should be answered first, or whether more information was needed in order to formulate sound policy decisions. The reality is that the two need to be conducted in parallel; some policy decisions can (and should) be made up front, while other decisions would benefit from more information. Recommendation 1 tackles many of the outstanding policy questions while Recommendations 2 through 5 are primarily technical in nature. Recommendation 6 calls for the preservation of the Advisory Group and describes its future role. The Advisory Group should be offered the opportunity to provide input and feedback on all of the recommendations, as they are performed. A timeline for completing these recommendations is presented at the end of the section.

Recommendation 1 – Address the legal and policy questions

There are a number of outstanding legal and policy issues that need to be considered and decisions made prior to developing and implementing instream flow recommendations. Major issues raised by the Advisory Group are presented below:

Factors that can legally be considered in developing a flow recommendation

There are many uses and benefits of flow in streams and rivers, but it is not clear if all can be legally considered in developing instream flow recommendations. A legal determination needs to be made as to which factors can be considered.

Effect on current and future water right holders

Stakeholders who rely on consumptive and non-consumptive uses of water must understand the potential effect of the implementation of an instream flow recommendation on both existing and future users. In most states, existing water right holders are legally protected from new instream flow standards. However those that had expected to be able use water in a basin for their future water supply

needs, but do not have a permit, can be impacted. This philosophy might be appropriate for Oklahoma, but it is a major policy decision that state leadership needs to provide input on.

Process for implementing flow recommendations

Once a flow recommendation has been developed, it is important for all parties to understand how the flow recommendation will be implemented. In particular, opportunities for stakeholder input and peer review should be clearly identified. This question should be answered in conjunction with the development of the draft methodology, described in Recommendation 3.

Statutory changes

Through developing responses to the issues listed above and recommendations outlined below, if it becomes obvious that existing statutes need to be changed or amended, it is important that this takes place before progressing with instream flow studies to develop flow recommendations.

Is an instream flow program necessary in Oklahoma?

Following completion of Recommendations 2 through 4, the OWRB in conjunction with the Advisory Group and state leadership should determine whether in fact there is a need to proceed with instream flows studies and the development of an instream flow program.

Recommendation 2 – Study other mechanisms for protecting instream flows

The state should evaluate the degree of streamflow protection offered by the domestic use set-aside. This subject was addressed in the Advisory Group meetings, but needs to be investigated further. Specifically, estimates of actual flow, naturalized flow, actual water use, timing of actual water use, the domestic use set-aside and the amount of water available for appropriation in each basin need to be examined at representative locations across the state. There are several software tools available for analyzing the resulting hydrographs from an instream flow perspective. Supplemental information such as future water supply needs, water quality, endangered species, recreational interests, geomorphology characteristics, and societal concerns could also be considered, where available. The study should also investigate other forms of flow protection, such as interstate compacts and differences between permitted diversions and actual use. The resulting analysis would enable scientists and policy-makers to examine the degree of hydrologic alteration resulting from current and future water use, and the amount of flow protection provided by the domestic use set-aside or other forms of flow protection that may already be in place, or could be easily implemented. This information will be useful in future dialogs on instream flows.

Recommendation 3 – Develop a draft methodology for instream flow studies in Oklahoma

If it is determined that the domestic use set-aside and other mechanisms do not, or may not fully protect instream flow needs, there are still some questions that need to be answered regarding the process for developing instream flow recommendations and the form of those recommendations. These questions could be answered by developing a draft methodology and a process framework for conducting studies and implementing the findings. In fact these subjects were discussed in the Advisory Group meetings and Section 2 offers some suggestions on what might work for Oklahoma. The technical methodology is probably best developed by individuals with a technical background, while the process framework should be developed by those with an intimate knowledge of the regulatory framework. Both should be developed in concert with state leadership and policy-makers. The methodology should detail how a flow recommendation is developed, from a practical viewpoint. The methodology should also include a description of how the economic impacts will be estimated and provide a more detailed definition of instream flows, tailored to conditions and requirements in Oklahoma. The report should be developed with input from the Advisory Group and the methodology should be subjected to an independent peer review.

Recommendation 4 – Conduct a study on the economics of instream flows in Oklahoma

The relationship between the economy and the environment in the western states is not as clear as it used to be - resource managers used to have to decide between the economy and the environment.

However, people want to live, work and have access to areas of natural, scenic beauty where opportunities for recreation and outdoor activities exist and that desire has economic implications. This doesn't mean that instream flows need to be protected at all costs because there are many needs for the water in rivers, including consumptive uses – for example irrigated agriculture, public water supply and industrial applications. The need for instream flows must be reconciled with other uses of that water and a successful instream flow recommendation balances these various needs. As the balance of needs changes in the future, so may the instream flow recommendation in the future.

Subject to the findings of the recommendations described above, more information on the economic impacts would need to be developed prior to the implementation of instream flow recommendations in Oklahoma. Some of the Advisory Group members expressed concern about the cost of instream flow studies and the economic impacts in the receiving basins. While the cost of conducting an instream flow study is fairly easy to estimate given a methodology, the economic impacts of preserving flow in a watershed or even at a point on a river is notoriously difficult to calculate and meaningful results are often elusive. However, it has been suggested that both be considered prior to conducting any instream flow studies in Oklahoma and certainly before implementing any instream flow recommendations. The following economic studies are suggested:

a) Cost of studies

Comprehensive, holistic instream flow studies can cost over a million dollars per site, while a simple desktop approach such as the Tennant method described in Section 2 requires minimal resources to develop a flow recommendation. With the draft methodology developed in Recommendation 3, it would be fairly straight-forward to determine how much it would cost to perform a single instream flow study somewhere in the state of Oklahoma, though costs are typically site-specific and based somewhat on the need for data that may or may not already exist. Costs should include any additional monitoring required. It should also be noted that instream flows studies are often conducted for a whole basin or region, rather than a specific location or sub-basin. If appropriate, the results are then applied to a larger geographic area. The costs of these larger scale studies may be slightly more, but there is an economy of scale that needs to be factored in.

b) Cost of managing an instream flow program

Beyond investigating the cost of studies, it would be beneficial to obtain the full cost to the state to manage an instream flow program. Neighboring states should be contacted and information on their program budgets requested. There will be large differences between states and any financial figures presented should carefully describe what is provided, with their associated budget. During the study, it would be beneficial to determine the cost of mechanisms already in place versus an instream flow program for protecting flows in Oklahoma.

c) Economic impact of implementation

Several studies on the economic costs and benefits of maintaining instream flows have been conducted across the United States in recent years. Studies typically focus on the ecosystem and recreational benefits and the economic consequences of a basin being deemed fully appropriated where there might have been water available had an instream flow recommendation not been made. In addition, the economic consequences should address the impacts to future water users in comparison to current conditions, i.e. where water is available and no instream flow values have been assigned. It is recommended that information be gathered on this subject and the findings summarized in a report. A

determination should also be made as to how relevant the findings are to streams and rivers in Oklahoma. The Advisory Group members are particularly interested in case studies where interstate compacts are involved and any parallels that exist to the current situation in Oklahoma.

Recommendation 5 – An instream flow pilot study in a scenic river

If the state still has an interest in pursuing instream flow studies for the state of Oklahoma after the recommendations presented above have been carried out and the findings fully discussed, then the remaining questions can only be answered by carrying out a pilot study. Different methodologies for conducting instream flow studies are described in Section 2 and the development of a proposed methodology for Oklahoma is outlined in Recommendation 3 of this section. Some of the methodology will be difficult to define clearly without a working example. Furthermore, many of the outstanding questions regarding how an instream flow recommendation is developed in a public forum could be answered through a pilot study. Targeting one of the designated scenic rivers for the study would be less controversial, and more information on flow needs might be available within one of these protected areas. The purpose of the pilot study is to firm up, with stakeholders, the specifics for conducting studies (including the process for developing of goals and objectives for the basin, and the role of scientists and the public) that everyone is comfortable with. The results and recommendations of the study would be reported to the legislature, the Advisory Group, and other interested stakeholders for review and input, allowing the opportunity for discussion on the proposal prior to the OWRB beginning the development of a policy on instream flows.

Recommendation 6 – Preserve the instream flow Advisory Group

Throughout this process, the instream flow Advisory Group has been very useful in providing input and guidance on how (or if) an instream flow program should come about and issues of importance to the members. Significant progress can be made when representatives from industry and environmental groups are on the same page regarding instream flows. Having a mechanism in place whereby water resources planners and the developers of water policy can effectively discuss issues as they relate to instream flows has been very useful and will likely continue to be useful in the future. The existing Advisory Group committee members are interested in continuing to provide input on instream flows and they would like to be kept apprised of any developments. They may also help coordinate the peer review process. Furthermore, members have suggested that they periodically provide reports to the Legislature on progress the group has made and information they have gathered on the subject of instream flows. It is suggested that the Advisory Group develop these progress reports on a six-monthly basis, corresponding to key milestones in the timeline described below.

The membership of the Advisory Group will probably change over time, and communication methods between members may take a different form in the future, such as email, discussion board or conference calls to reduce time and resources required. For individual studies, it may be that a subset of the Advisory Group is used or additional stakeholders needed, however the existing Advisory Group should be offered the opportunity to participate in the process. All members should have an interest in preserving the beneficial use of water in the state or basin.

The following Gantt chart shows the suggested order and time frame for completing the recommendations. The timeline should be revisited once scopes of work have been developed for each recommendation and may need to be adjusted periodically, subject to the results of the technical studies and policy decisions. In the timeline presented below, the Advisory Group is given three months after completion of each report to review and provide feedback to the OWRB, the Legislature and other interested parties.

Recommendations to Address State-Tribal Water Issues

The following recommendations from the OCWP Report on Tribal Issues and Concerns are the result of extensive discussions between Dr. Lindsay Robertson, University of Oklahoma Professor of Law, and representatives of Oklahoma's Indian Tribes. This effort was commissioned by the Oklahoma Water Resources Board to identify the state's pertinent water-related tribal issues and offer appropriate recommendations concerning water rights claims and mutual water interests.

Recommendations:

1. That the State determine who within state government has the authority to approve a process for negotiation of water rights issues with tribes, who within state government has the authority to conduct such negotiations, and what the approval process is once negotiations are complete.
2. That the State assemble a team fully authorized to meet with tribal representatives to devise a process for the discussion and resolution of tribal water rights claims.
3. That upon the determination of process, the State appoint a fully authorized negotiating team to begin discussions with tribal representatives.
4. That upon the conclusion of negotiations (either individual, group or otherwise, as determined by the process planners), the results be submitted for such State approval as is required.
5. That the State consider the implementation of regular consultation protocols.

Water Quality Workgroup Policy Recommendations

The following recommendations were submitted by the OCWP Water Quality Workgroup consisting of numerous representatives of local and tribal governments along with state and federal agencies that participate in water quality-related duties and programs in Oklahoma. These individuals were asked to provide program information related to their organizations and agencies as well as collective recommendations to address Oklahoma's most pressing water quality issues, including program requirements. These recommendations, developed specifically for the 2012 Update of the Oklahoma Comprehensive Water Plan, are also included in the OCWP Water Quality Workgroup Report.

The following policy recommendations are submitted by the OCWP Water Quality Workgroup to compliment those derived through the OCWP's formal public participation and policy development process. The Water Quality Workgroup consists of representatives from local and tribal governments along with state and federal agencies that participate in water quality-related duties and programs. These individuals were asked to provide program information related to their organizations and agencies as well as collective recommendations to address Oklahoma's most pressing water quality issues, including program requirements.

Enumerated below are a summary of recommendations identified by the OCWP Water Quality Workgroup as having priority in regards to immediacy for implementation. [The complete list of Workgroup recommendations is available in the Water Quality Workgroup report.]

1. The current Surface Water Quality Monitoring Programs should be expanded and enhanced to allow for the collection and management of more comprehensive data, including identification of long-term trends and potential threats to the state's streams and reservoirs.
2. Additional resources are required to facilitate current water quality data management and reporting needs.
3. A state Stream Gaging Network should be supported, enhanced and maintained. This should include extension of partnerships cooperating under the existing Stream Gaging Program.

4. Nonpoint Source Programs should be maintained and continue to implement innovative NPS pollutant reduction and management practices while also stressing use of proven measures. These programs should encourage development of technical assistance programs that promote establishment of pollution prevention plans by landowners.
5. The OCWP Water Quality Workgroup strongly supports establishment of a comprehensive Groundwater Quantity and Quality Monitoring Program for Oklahoma to investigate long-term trends of this sensitive and valuable resource.
6. Many contributors, including those from the 2010 Oklahoma Academy Town Hall Meeting, recommended that the State pursue interagency watershed and regional planning for water programs. The Town Hall meeting recommended the formation of regional planning committees to work with regional stakeholder-based water resources management groups.

Oklahoma Water Resources Board Policy Recommendations

This section includes recommendations developed by the Oklahoma Water Resources Board, the state's principal water management and planning agency, to enhance its ability to confidently and equitably provide clean, safe and reliable water supply for Oklahomans throughout the next 50 years and beyond.

Water Use Administration

The following recommendations were submitted by appropriate OWRB staff in support of OCWP policy development recommendations related to agency water use administration and management of waters statewide.

1. To ensure the beneficial, fair, responsible, and wise use of water, the OWRB should:
 - Provide for a suspension period from water rights cancellations due to non-use if the non-use is a result of the water rights holder actions to employ prescribed conservation measures, such as irrigating crops which are more water-efficient or implementing water system leak detection or rationing programs.
 - Institute an administrative fining system for unlawful or unpermitted use of water, willful failure to report water use or falsification of water use report forms.
 - Conduct field verifications of 1) location and condition of stream water works and groundwater wells, 2) groundwater levels, and 3) compliance with permit conditions regarding water use and respond to interference concerns between neighboring water right interests.
 - Expand public outreach and education initiatives to increase public knowledge of water law and property rights, water use and reporting, conservation and water quality protection.
2. To more realistically predict seasonal stream water shortages and provide greater assurance that water will be available, the OWRB should:
 - Organize a statewide workgroup of water users, academia and other experienced professionals to investigate the utility and impacts of transitioning from an average annual to a seasonal stream water allocation program.
 - Integrate modern and more robust stream water allocation modeling technology into the state's water rights administration program to assess new water right applications and potential effects on domestic users and senior right holders, provide pre-drought warning to junior appropriators, identify locations across the state where demand and likelihood for interference is substantial, and assess the effects of potential water policy scenarios.
3. To continually assess water supply availability, the OWRB should support the formal OCWP recommendation requesting a dedicated source of funds to conduct and update statutorily-required hydrologic yield studies of Oklahoma's groundwater and surface water resources.
4. To prevent contamination of fresh groundwater sources, the OWRB should:
 - Investigate potential methods to equitably regulate the use of moderately brackish groundwater sources in a manner that protects fresh water aquifer zones. While the OCWP Marginal Quality Water Workgroup report does not address moderately brackish groundwater use, information and recommendations provided in the Workgroup's report could prove useful to this investigation. The withdrawal of waters with total dissolved solids concentrations above 5,000 parts per million are not currently regulated by the state.

- Investigate other states' abandoned well plugging programs and identify funding mechanism (e.g., approximately \$30,000 state seed monies with possible landowner cost-share) to remediate tens of thousands of existing unplugged or improperly plugged water wells statewide. Work in conjunction with the Oklahoma Groundwater Association and licensed well drillers.
 - Establish a workgroup to investigate other states' water well drilling programs and assess the feasibility of establishing an intent-to-drill system in Oklahoma. This system would provide oversight of all new water wells drilled each year, provide a mechanism for pre-drilling review of the proposed drill site and drilling inspection to prevent pollution through improperly completed wells.
5. To mitigate catastrophic flooding hazards and protect lives, property, and water supplies, the State should:
- Continue to support local floodplain management efforts through cooperative partnerships with local engineering firms to update maps and studies, develop floodplain ordinances, and promote Oklahoma Floodplain Managers Association-sponsored outreach and certification activities to educate community officials and citizens.
 - Continue to support dam safety dam breach inundation mapping, emergency action planning, and education and outreach efforts to ensure the safety of over 4,500 dams under state jurisdiction and protect lives and property from dam failure. Future mapping activities should be sufficiently funded to produce more accurate and current breach inundation maps.

Cooperative Stream Gaging Network

Stream-gaging stations are distributed across Oklahoma providing sufficient spatial coverage of many of the State's waterways. Various stream types are represented by the network – from steep streams to low gradient, meandering streams; from free-flowing streams to streams with sufficient reservoir storage to moderate the effects of flooding; and from small brooks to large rivers. The drainage-basin size upstream from stream-gaging stations in the state varies from approximately 3 to 127,000 square miles.

Stream gages serve many purposes and are vital in a variety of data needs. The major purposes that stream-gaging data is used for include providing necessary information for accurate water planning; quantifying stream-flow in major and minor watersheds; supporting flood and water-supply forecasting; supporting Oklahoma water administration; determination of trends in flow; supporting water-quality networks in Oklahoma; collecting valuable water quality information; protecting public safety; providing information critical to water rights administration; bridge construction and safety; and pollution control and remediation. It should be noted that these are only some of major uses of the collected information and isn't a comprehensive listing of all of the data uses and shouldn't be used as the sole means for determining the value of stream-gaging to Oklahoma.

Recommendation:

- Improving the coverage of any stream-gaging network is an ongoing process that requires simultaneous consideration of numerous issues and alternatives. In total, the Oklahoma Comprehensive Water Plan recommends that 184 historical and currently existing continuous gages be maintained and fully-funded at a minimum and that the following eight additional gages be added to the program:
 - I. *Canadian River downstream from border with Texas and upstream from Bridgeport, OK*

This site would be used to determine flow from Canadian River as it enters Oklahoma. Currently, the OWRB operates a stage only water quality station at Canadian River, US 183 near Taloga that could be converted to a real time station. There is a rating in place for this station, with additional high flow work needed.

2. *Kingfisher Creek near Kingfisher, OK (07159750)*

This site would be used for flood warning for the City of Kingfisher.

3. *Rush Creek near Purdy, OK (07329000)*

This site would be used for flood warning for Pauls Valley and also for possible future water supply.

4. *Elk Creek near Hobart, OK (07304500)*

This site would be used for water supply and possible transport to Lake Altus, also to support water-quality activities. The OWRB operates and maintains a real time stream gage below the historical gage at Hobart. Recommend a gage be established upstream of Hobart approximately 2 miles to minimize back flow effects of high stage of the North Fork of the Red River.

5. *Washita River near Carnegie (07325500)*

Adding discharge to this stage-gage would fill in the large flow gap between the upstream Washita River at Clinton site and the downstream Washita River at Anadarko site. This station also would assist in flood warning for the city of Anadarko. The OWRB operates and maintains a gage at Cordell which might be able to “fill-in the gap” that the Carnegie gage historically filled.

6. *Cottonwood Creek near Seward, OK (07159750)*

Adding discharge to this stage-gage would assist with future water supply needs.

7. *Wildhorse Creek near Hoover, OK (07329700)*

Adding discharge to this stage-gage would assist with future flood control and water supply needs.

Most of the proposed gages are U.S. Geological Survey (USGS) sites that were previously temporary sites, stage-gage only sites, or were permanent sites that have been discontinued. Recognizing the many issues confronting the state’s water resources – such as out-of-state activities, intra-basin transfers, pollutant loading, and the demand for new and contingency sources of public drinking water – continued support and implementation of Oklahoma’s stream-gaging network is imperative to foster effective, efficient and responsible water resource management.

Drinking Water Infrastructure

Oklahoma’s drinking water infrastructure is responsible for countless social, economic, and environmental benefits to Oklahoma communities, not to mention the overall quality of life it provides to its citizens. More specifically, the establishment and maintenance of water treatment and delivery systems are imperative to a safe and reliable water supply. For every billion dollars in infrastructure projects, Oklahoma is projected to realize almost \$2.4 billion in revenues for all industries; an increase of almost \$758 million in earnings of households employed by industries in the state; and the creation of 24,739 jobs.

As an important part of the 2012 OCWP Update, the OWRB engaged FirstSouthwest Company to assess the ability of the Oklahoma Water Resources Board's drinking water infrastructure financing programs to meet the state's forecasted water system needs, which were projected through the Water Plan's technical analysis, conducted by CDM. In its report, FirstSouthwest estimated that Oklahoma will require \$87 billion to meet its drinking water infrastructure requirement over the next 50 years; the many small water providers in Oklahoma (those serving 3,300 or fewer citizens) comprise about 46 percent of this need but represent only about 16 percent of the state's population. Current financing programs offered by the Oklahoma Water Resources Board and other state and federal agencies are ill-equipped financially and otherwise to address the impacts of aging and dilapidated systems, increasing regulatory requirements, and community growth and expansion. It is estimated that the OWRB's Drinking Water State Revolving Fund (DWSRF) and traditional loan programs, the state's primary financing source for drinking water projects, are capable of meeting only less than 10 percent of Oklahoma's future \$87 billion need for drinking water infrastructure. In addition to the obvious fiscal resources required to keep up with the need, the lending capacity and structure of the state's existing infrastructure financing programs may be inadequate.

Recommendation:

To address Oklahoma's considerable drinking water infrastructure need and the inability of current programs to meet that need, the Oklahoma Water Resources Board recommends:

- A team of financial and water infrastructure professionals, led by the OWRB, should investigate development of a separate state funding program designed and equipped to meet the state's projected \$87 billion drinking water infrastructure shortfall by 2060. This investigation could also contemplate the considerable financing needs specific to wastewater infrastructure in Oklahoma. Any potential program should include a specific mechanism to address the considerable financing needs of small communities in the state.

Water-Related Research

The Oklahoma Water Resources Board strongly supports continued and increased funding for water-related research activities at the state's universities. A significant understanding of Oklahoma's water issues can be accomplished through frontiers of research and the practical application of that research for the benefit of the state's citizens. The OWRB, through the Oklahoma Comprehensive Water Plan, strongly encourages the establishment of collaborative forums consisting of state, federal, local and tribal representatives to coordinate and prioritize ongoing research activities at the state's many universities. Further, state support through annual general appropriations from the State Legislature is not only recommended, but is considered critical. In turn, institutions should work collaboratively to maximize efficiency, minimize topical overlap, focus priorities and, when appropriate, form cross-institutional teams to compete for grant opportunities.

In particular, the OWRB strongly recommends an increase in or establishment of a regular funding appropriation for Oklahoma's university research units, including the Corix Water Institute, Oklahoma Water Survey, and Oklahoma Climatological Survey at the University of Oklahoma; and the Water Research and Extension Center and Oklahoma Water Resources Research Institute at Oklahoma State University. These entities provide critically important data and tools imperative to informed decision-making concerning the management and protection of water resources across the state.

The following priority water-related research needs, supported by information and input gathered throughout development of the 2012 OCWP Update, should be pursued by the State of Oklahoma:

1. Research related to agricultural water use in support of Oklahoma's vital agriculture industry. (Refer to the OCWP's Agricultural Water Recommendations.)
2. Research furthering the understanding and quantifying the role played by water in support of the environment and related ecological and recreational benefits. As appropriate, such research should support implementation of recommendations offered by the OCWP Instream Flow Workgroup.
3. Research seeking development of practical, state-of-the-art predictive tools for water managers and users in Oklahoma, which are imperative to both short- and long-term decision-making and in mitigating the impacts of drought, flooding and dynamic climate patterns.
4. Research related to a better understanding of the interaction between surface and groundwater in the state's alluvial aquifer and stream systems. (Refer to the OCWP Public Input Recommendation entitled Surface/Groundwater Interaction.)
5. Research related to enhanced general understanding of Oklahoma's climate. The Oklahoma Climatological Survey should continue its exemplary programs and efforts to explore the state's varying climate and collaboratively apply that knowledge to a multitude of sectors. (Refer to the OCWP's Climate Water Policy recommendations.)
6. Research supplementing knowledge of Oklahoma's groundwater resources. Establishment of a statewide groundwater quality and quantity program is imperative to this effort.

OWRB Legal Analysis of State Water Management Considerations

Riparian Rights to Reasonable Use

ANALYSIS: The Oklahoma Supreme Court in the 1993 Franco case re-instituted the common law riparian rights to reasonable use doctrine as superior over the 1963 statutes which had declared that all uses except domestic use had to be recognized as appropriation rights. The Oklahoma Legislature responded to the Oklahoma Supreme Court's decision by statute in 1993 by expressly declaring that only appropriation rights and riparian domestic use rights survived the 1963 statutes. The 1993 statute has not been tested in a court. The riparian and appropriation systems as recognized by the Court in the Franco case are incompatible and create uncertainty and a cloud over rights claimed under both systems.

OPTION: Amend the Oklahoma Constitution to limit the effects of riparian rights by either confirming the 1963 and 1993 statutes that limit riparian claims to domestic uses or require reasonable and beneficial use of all water uses to limit the uncertainty of future use claims by riparian landowners.

General Conditions on Permits

ANALYSIS: In an attempt to ensure maximum beneficial use of water through provisions requiring that a proposed use of stream water will not interfere with domestic uses and existing appropriations, the OWRB can impose conditions on a permit and limitations on the use of water. This authority, which is closely tied to the Board's determination of water available for appropriation, may require clarification. The Oklahoma Supreme Court and an Attorney General opinion recognized that the OWRB has "plenary" authority over unappropriated water, but there are several specific policy issues relating to stream water appropriation that could be clarified by statute.

OPTION: Amend the statute relating to consideration of applications to expressly state that the OWRB can impose conditions and limitations on the use of water to ensure the proposed use is a beneficial use, and to ensure that the proposed use will not interfere with domestic uses and existing appropriations. Some permit applicants may object to more conditions and may see such conditions as a before-the-fact

(before permit is issued and use begins) overreaction to concerns that might never develop even after the permit is issued and use actually begins. This could be addressed through the addition of example conditions and limitations to the statute. Other clarifications concerning the appropriation law could be included in statutory amendments directly relating to gaging/monitoring, storage or diversions; clarifying the burden on potential interference; beneficial use and efficiency; and present or future need.

Permit Condition Associated with Protecting Reservoir Yield and Defining Interference

ANALYSIS: Concerns have been raised about protecting the yield of reservoirs, particularly by some appropriation right holders that authorize use of water from storage reservoirs constructed by a federal agency. During low flow or drought conditions, there is no mechanism currently in place to notify junior upstream appropriators if interference is occurring or to enforce curtailment of ongoing diversions, thus reducing the reservoir's dependability in delivering water supply to users.

OPTION: Form a workgroup of reservoir managers and watershed stakeholders to investigate the feasibility of establishing an agreement to condition the junior permit to discontinue the diversion of water during periods when interference is most likely, such as when the reservoir's water level is at or below the normal pool elevation.

Indian and Federal Reserved Water Rights Claims

ANALYSIS: From a water rights administration standpoint, a fundamental reason to address and resolve Indian water rights claims and federal reserved rights claims relates to the water accounting system that is critical to proper implementation of the appropriation doctrine and water planning. Quantification of potential Tribal claims to water is essential to the validity of water accounting information and data required for the OWRB to accurately appropriate water resources. This is not to say that state recognized rights to use water are invalid or subject to being determined invalid. State rights could be affected by claims that are subsequently determined to be valid and possess a better (more senior) priority under the appropriation doctrine.

OPTION: The OWRB endorses the OCWP Public Input recommendation – as well the process recommended by Lindsay Robertson following discussions with Tribal government representatives under an OCWP agreement – that the State continue dialogue with appropriate representatives of Oklahoma's Tribal Nations to address concerns over mutual water issues.

Excess & Surplus Water Definition & Procedure

Oklahoma statutes authorize, empower and direct the OWRB to "prepare a comprehensive state water plan and decennial updates thereof for submission to the Legislature and, in connection therewith, to conduct surveys and cooperate with other state and federal agencies. Such comprehensive state water plan and the parts and portions thereof shall be submitted in final and completed form not later than September 1, 1975, and, in addition to the foregoing requirements, shall include a definition of "excess and surplus water of this state" and a recommended procedure for determining "excess and surplus water of this state," which definition and procedure are to be developed to insure that the area of origin will never be made water deficient."

SUGGESTED DEFINITION: "For implementation of the 2012 Update to the Oklahoma Comprehensive Water Plan, 'excess and surplus water' shall mean the volume [or a percentage of the volume] of stream water measured in acre-feet per year within each of the 13 OCWP watershed planning regions (i.e., areas-of-origin) in the state that is estimated to be available for water permits (for use of water inside or

outside the watershed of origin) at the watershed outlet at the conclusion of the year 2060, provided that nothing herein shall affect ownership rights to groundwater."

SUGGESTED PROCEDURE: To determine "excess and surplus water," the total projected demand for water within each of the watershed areas-of-origin as estimated in the 2012 OCWP Water Demand Forecast Report shall be subtracted from the cumulative total of the estimated amount of stream water that physically originates within each watershed planning region (i.e., area-of-origin); provided that any estimated amount of groundwater underlying each watershed area-of-origin shall be disregarded as being physically available; and provided further, that the flow at the watershed outlet estimated to be available less than 10% of the time, and the quantity of water adjudicated or agreed to be available for federal or Tribal rights, instream or environmental needs shall never be considered excess and surplus water. Cumulative total flow for the watershed area-of-origin shall be based on the period of record for the gage at or near the watershed outlet or estimated from data from the closest gage in the watershed area-of-origin having similar hydrologic conditions.