Western States Watershed Study
Executive Summary Report to USACE HQ
August 2008

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Foreword

This report and supporting technical reports were prepared as a collaborative effort by individuals and organizations from State, Federal, and local levels of government. Key Federal participants included the U.S. Army Corps of Engineers, the U.S. Bureau of Reclamation, the National Oceanic and Atmospheric Administration, the U.S. Environmental Protection Agency, the Natural Resource Conservation Service, and the U.S. Geological Service. Key State organizations included: the Western States Water Council, the Western Governors Association and 17 affiliated Western States, the Bear River Commission, and the Interstate Council on Water Policy.

This report provides an executive summary of the Western States Watershed Study, as well as study goals, objectives, products, conclusions, and recommendations. For detailed findings and recommendations please reference the supporting technical reports listed in Part IV A, which are available under separate cover.

This report was written for two primary audiences, the Western States Water Council and the U.S. Congress. The Western States Water Council will use selected information from this manuscript in their progress report on the initiatives outlined in the Western Governors Association, Water Needs and Strategies for a Sustainable Future (June 2006).

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Study Overview and Major Findings

On 17 October 2006, the Corps of Engineers (Corps) and Western States Water Council (WSWC) signed a Shared Vision Partnership Agreement (SVPA) and agreed to work collaboratively to develop study activities that would contribute to the implementation of several recommendations associated with the priority water resource challenges as identified in the Water Needs and Strategies for a Sustainable Future Report. This document was prepared by the WSWC and released by the Western Governor's Association (WGA) in June 2006. The goals set forth in this agreement provided the direction for the two-year Western States Watershed Study (WSWS). For this study, Specialized Project Delivery Teams (PDT's) were formed to address selected recommendations and accomplish associated tasks. The PDT's were typically comprised of technical experts from Corps, WSWC, and other Federal agencies. Collectively, the specialized PDTs are referred to as the Western States Watershed Study PDT.

The specialized PDT's addressed the following subjects: Water Data Collection, Drought, Watershed Tools and Collaborative Planning, Federal Resources, Federal Asset Management, Climate Change, and Collaboration with multiple tribes. In partnership with the WSWC, the Corps provided leadership and facilitated the PDT activities. The Project Manager (PM), working with the Executive Director of the WSWC and under the general supervision of the Corps Southwestern Division Senior Leader, provided study management and leadership associated with the overarching Shared Vision Partnership Agreement goals.

Beginning in July 2006 and based on the information needs of the WSWC and technical PDT's, PDT members typically participated in the three WSWC meetings each year, as well as other technical workshops and conferences. Through this collaborative process the resources of multiple federal agencies were leveraged as opposed to each agency working independently with the WSWC. This concept is informally referred to as a "western states federal agency support team". The establishment of a formalized Western States Federal Agency Support Team (WESTFAST) and a Western States Federal Liaison Position to lead the team, are the overarching recommendations of this study. The formation of WESTFAST and a Western States Federal Liaison Position are in the very early stages of development, however, the WSWC believes, and study results support, that this effort has potential to help strengthen collaboration between the Western States, federal agencies, tribes, and other stakeholders and local authorities.

The findings, conclusions and recommendations in this Executive Summary are supported by several technical papers and reports prepared by the technical PDT's to address each study topic. PDT members also contributed their talents and expertise in response to invitations and opportunities to present information at State, Federal and local venues.

The PDT is pleased to present this report to the Corps, Congress, WGA, WSWC and others, and is confident that the information contained herein will support efforts to improve future planning and management of water resources in the Western United States.

Introduction

The Western States Watershed Study (WSWS) was one of five national studies conducted under the FY06 Energy and Water Development Appropriations Act (PL 109-103). This act directed the Secretary to conduct at full federal expense, comprehensive analyses to examine multi-jurisdictional use and management of water resources on a watershed or regional scale.

The Western Governor's Association (WGA) acts as a center of innovation and promotes shared development of solutions to regional problems. To address a broad spectrum of water resource challenges facing the West, the WGA, in 1965, adopted a resolution creating the Western States Water Council (WSWC). The WSWC consists of representatives appointed by the governors of 17 Western States (Figure 1). The chartered purposes of the Council include accomplishing effective cooperation among Western States in the conservation, development and management of water resources. In support of this purpose, the WSWC completed a report on Water Needs and Strategies for a Sustainable Future, which was released by the WGA in June 2006 (Figure 2). This report will hereafter be referred to as the June 2006 Report.

Figure 1: Study Focus Area

The overarching goal of the WSWS was to support the efforts of the WSWC to implement several high priority recommendations identified in the June 2006 Report. To the extent possible, study activities were conducted in a collaborative manner with other federal agencies, the WSWC, WGA, and other stakeholders. Those initiatives culminated in plans and strategies that can be implemented under current authorities of the Corps, other federal agencies, state and local entities, and non-governmental interests. In some cases, the study identified high priority needs that may require exceptions to existing policies.

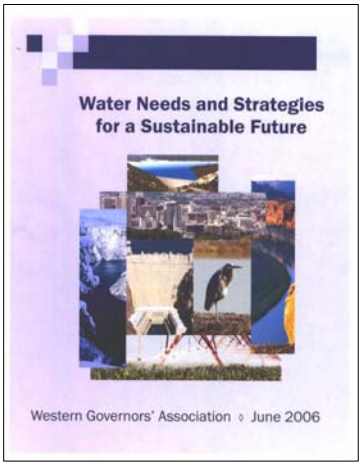
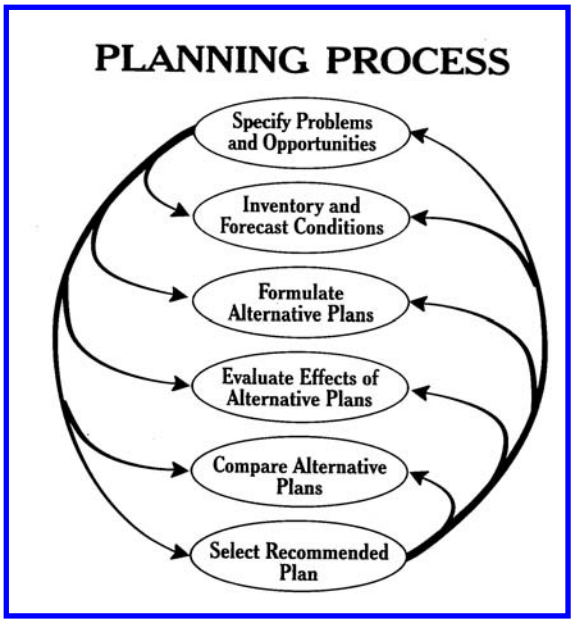


Figure 2: Study Focus Area

The Study focused on the 17 Western States (see Figure 2) and addressed the following five regional water resource topics:

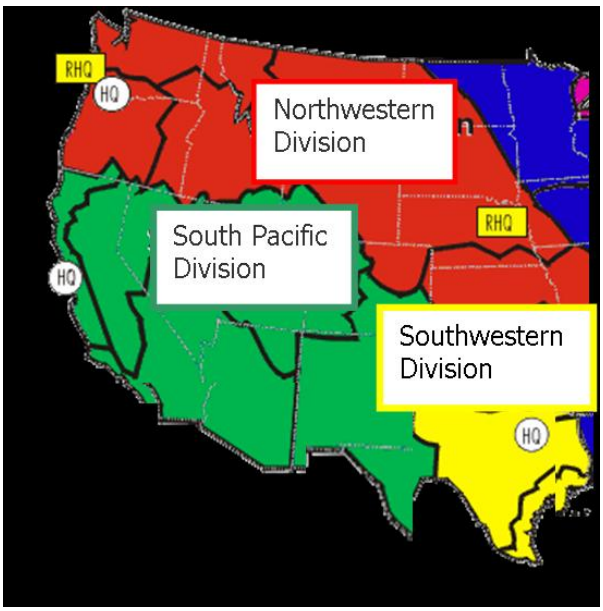
1) Drought, Natural Hazards, and Climate Change Preparedness
2) Watershed Tools and Collaborative Planning
3) Federal Resources and Collaboration Initiatives

4) Infrastructure Needs; and
5) Policies and Programs.



Study activities incorporated steps one through three of the Corps' six-step planning process (identify problems and opportunities, inventory and forecast conditions, and formulate alternative plans/strategies) (Figure 3). The strategic plans and recommendations developed and identified from application of these first three steps are intended to be flexible and will be updated in the future based on new information. If desired, future implementation of strategic plans could continue planning steps one through three followed by steps four through six (evaluate alternative plans, compare alternative plans, and select plans for potential implementation).

Figure 3: Corps Six-Step Planning Process



Study Management & Technical Resources

- **Executive Oversight Committee**
- **Technical Advisory Team**
- **Headquarters Support Team**
- **Project Manager**
- **Project Delivery Team (PDT) Leads**
- **Corps PDT technical resources (Institute of Water Resources (IWR), and the Engineer Research and Development Center (ERDC)**
- **Federal Support Team (experts from USGS, BOR, EPA) participated on PDT's**
- **Experts from tribes and the WSWC participated on PDT's**

Figure 4: Study Management and Technical Resources

The Study was conducted over a two-year timeframe (spring 2006-2008). Study leadership was organized as follows: a Project Manager; an Executive Oversight Committee consisting of the three Western Mission Command Subordinates (MCS); a Technical Advisory Team consisting of one representative each from the Northwest Division (NWD), South Pacific Division (SPD) and Southwestern Division (SWD); a

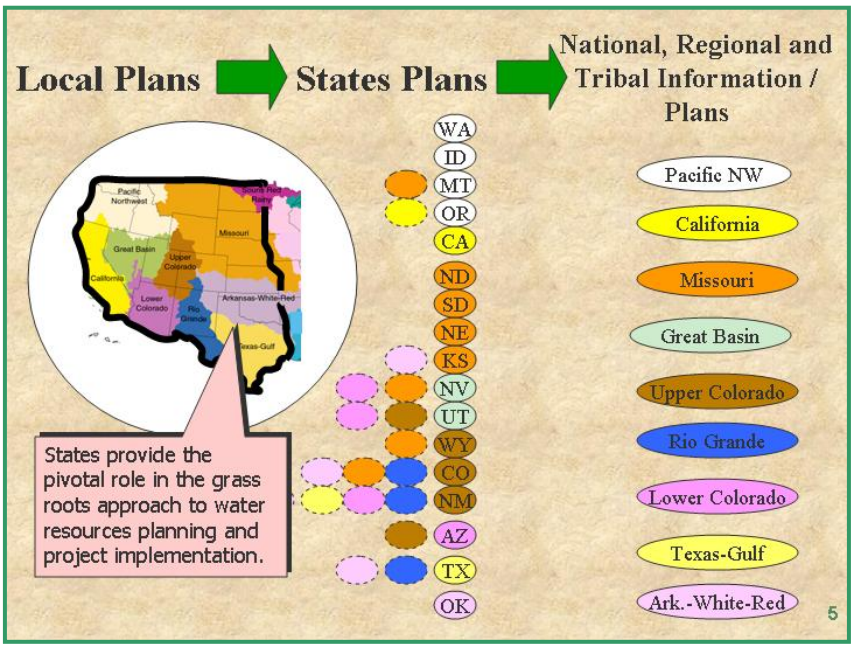
Corps Headquarters Support Team; and Lead Planners/project delivery team leaders, one each from NWD, SPD and SWD. The project manager directed the overall study efforts, and the project delivery team members directed the activities under each of the five topics listed above. The Headquarters Support Team, Executive Oversight Committee, and Technical Advisory Team provided direction, advice, and support as needed.

Technical resources from the Corps Institute of Water Resources and Engineer Research and Development Center played a critical role on each project delivery team. Additional technical expertise was provided by other federal partners including the U.S. Geological Service (USGS), U.S. Bureau of Reclamation (BOR), National Oceanic Atmospheric Administration (NOAA), Natural Resource Conservation Service (NRCS), and U.S. Environmental Protection Agency (EPA). These partners constituted an informal federal support team, as well as the WGA, WSWC, tribes, and other stakeholders, and local organizations (Figure 4).

Part I. Study Development

A. Developing the Study Approach

The purpose of the GE funded study, as directed by legislation, was to complete "comprehensive analyses that examine multi-jurisdictional use and management of water resources on a watershed or regional scale." This broad study authorization provided a flexible framework in which the Corps could explore a variety of study approaches. However, recognizing the value of building upon existing information and plans, and working with and/or facilitating the coordination between established organizations and groups, the Corps focused their approach to align with that of the WSWC, as defined in the June 2006 Water Needs and Strategies for a Sustainable Future Report.



Studies show the importance of a grass roots approach in successful watershed initiatives[1] and the important pivotal role of the states for water resources planning and project implementation (Figure 5). As Western states continue to carry out their traditional role with regard to water allocation and management, the challenges are increasing. With

Figure 5: The pivotal role of states in water resource planning and project implementation

changing and increasing demands on limited water resources, complicated by an increasingly complex overlay of federal laws and regulations, the importance of cooperative efforts and exchanges by and among states and the federal government has likewise been magnified.

The Corps recognized the tremendous opportunity to assist local watershed planning and management efforts by supporting the WSWC in their role of fostering collaboration and the exchange of views, perspectives, and experiences among member states. Furthermore, the Corps recognized the critical importance of greater and more unified support from the federal agencies in meeting water resource challenges. To this end, the Corps agreed on a study approach where the Corps would coordinate among federal agencies and the Western States to develop a unified water management approach that supported selected priority tasks in the WSWC/WGA 2006 report. Three important components of this approach included establishing the WSWC as a coordinating forum, the development of an informal Western States federal agency support team (Figure 6), and the implementation of specialized Project Delivery Teams.

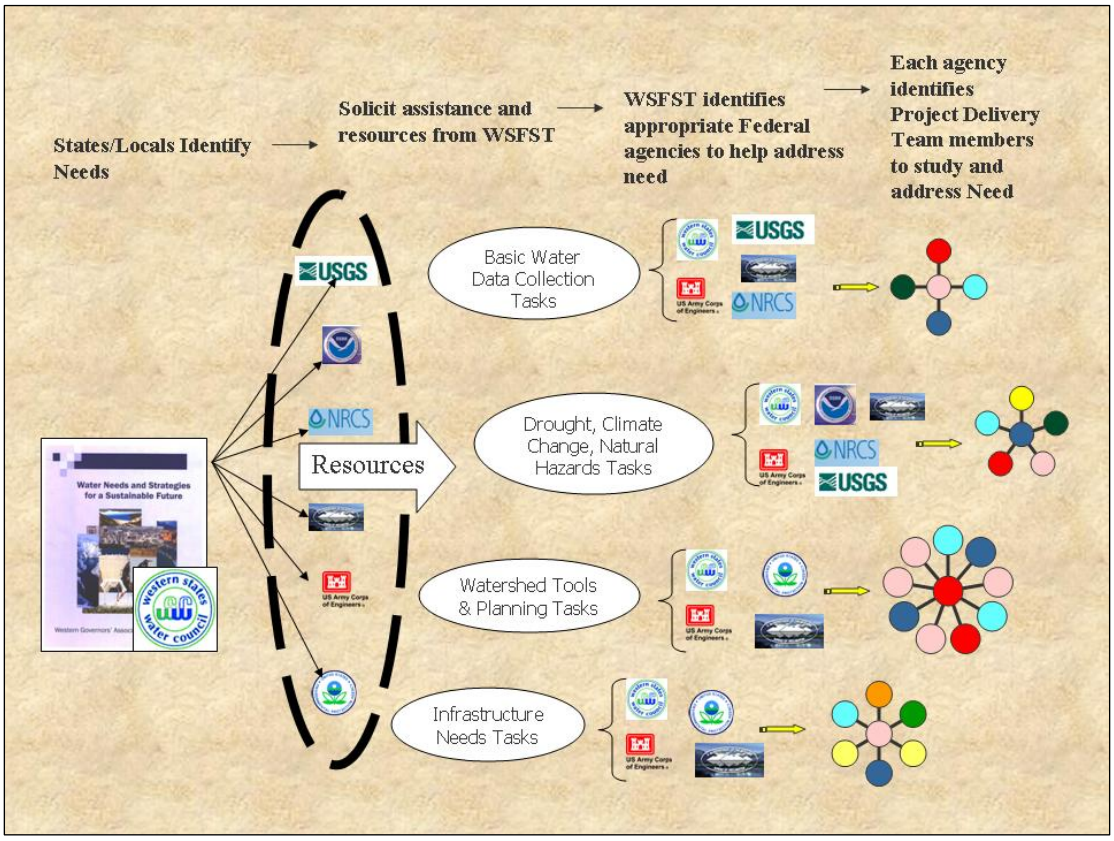


Figure 6: Concept graphic, Western States Federal Support Team

The Corps and WSWC coordinated the development of each scope of work for the selected priority tasks prior to implementation. This occurred by e-mail, phone conferences, the regularly scheduled WSWC meetings, and other venues. The leadership structure of the WSWC provided an effective means to coordinate and encourage the involvement of their 17 member states to provide feedback and guidance on proposed study activities. The

WSWC also provided the coordinating forum for the informal Western States federal support team by introducing and supporting the concept at their regular meetings and helping to organize break-out groups that included federal representatives.

The WSWC, Corps, and members of the informal Western States federal agency support team agreed that WSWS activities and results should be meaningful and generate positive action and benefits in the field of water resources beyond the designated period of the Study. Determining how to do this was a foremost question for all involved throughout the two-year study. This focus required creative individual and collaborative thinking, resulting in the strategic and collaborative action plans referenced in Section II.

B. Identifying Study Partners, Roles, Responsibilities & Resources

As noted in the Study overview, specialized Project Delivery Teams (PDT's), composed of members of the WSWC, Corps, and others were organized to address study objectives. The specialized PDTs, are known collectively as the PDT. Early in the study, the PDT investigated the value of a partnership agreement to formally unite PDT members, their roles and responsibilities, and formalize the Western States Federal Agency Support Team (WESTFAST) for post-study collaboration. However, after much discussion, members of the PDT determined that a Partnership Agreement limited to the WSWC and Corps would be adequate for the study. Upon study conclusion, the PDT would evaluate the need for a WGA/WSWC/WESTFAST Partnership Agreement. In the interim, a Shared Vision Partnership Agreement between the WSWC and Corps was executed 17 October 2006 by Mr. Duane Smith, Chairman of the WSWC and by Major General Riley, Director of Civil Works. This Agreement helped focus the efforts of the PDT and identify roles and responsibilities.

Table 1. PDT members and their involvement on study tasks.

Table 1: Federal and State Involvement per task on the WSWS

Summary of Strategic Planning Activities	WGA and WSWC	1	2	3	NWD	SPD	SWD	IWR	ERDC	4	5	6	7	8
Water Data Gathering	✓	✓		✓			✓	✓		✓	✓	✓		
Drought, Natural Hazards, and Climate Change	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓		
Watershed Tools and Collaborative Planning	✓✓			✓	✓	✓		✓	✓	✓				
Federal Resources and Collaboration Initiatives	✓✓				✓	✓		✓		✓	✓	✓		✓
Programs and Policies	✓✓✓				✓	✓	✓	✓	✓	✓	✓	✓		✓
Fed. Infrastructure Needs	✓				✓	✓	✓				✓			✓
Tribal Collaboration	✓					✓							✓	✓

✓ Denotes Overarching Facilitator Role ✓ Denotes Lead Planner Role
✓ Denotes Technical Lead or Co-Technical Lead Role
✓ Denotes Collaborative Participation
1- Interstate Council on Water Policy 2. EPA 3. BOR 4. USGS
5. NRCS 6. NOAA 7. BIA 8. HQUSACE

Informal Western States Federal Agency Support Team (WESTFAST)

As shown in Table 1, each study partner provided a unique expertise needed to adequately address the selected tasks in the June 2006 Report. For example, as a leader among federal agencies in water data collection and management the USGS chose to lead the Basic Water Data Collection task. USGS was supported by the WSWC, BOR, USGS, NRCS, NOAA, Corps, and Environmental Council of States.

To address the broad topic of Drought, Climate Change, and Natural Hazards, the PDT recognized the importance of working in support of existing efforts by others. This included the NOAA-led National Integrated Drought Information System (NIDIS), and the Federal Emergency Management Administration (FEMA) / Corps Silver Jackets Program. In addition, the State of California led efforts on a pilot study initiative to modify the Corps of Engineers rule curves for reservoir operations.

In contrast, the PDT identified the BOR and Corps as the primary partners to address the federal infrastructure needs task. Similarly, the Watershed Tools and Collaborative Planning task was supported primarily by the Corps Institute for Water Resources and the Engineer Research and Development Center because of the focus on Corps-developed tools. Furthermore, the specialized PDT members from other organizations provided critical review and comments that guided study recommendations.

Finally, the Federal Resources and Programs and Policies tasks were led by the Corps with support, input, and review from the full PDT. These tasks required the integrated reflections and lessons learned from the previous tasks to develop meaningful study recommendations. Furthermore, existing information was leveraged from existing programs and activities of various federal and non-federal agencies.

Most of the programs and activities by agencies and organizations such as BOR, EPA, and the Bear River Commission were underway or completed prior to the release of the June 2006 Report. The information from those ongoing or completed efforts helped accomplish some of the June 2006 Report recommendations. Examples of existing information resources associated with various programs and ongoing activities that contributed to the completion of tasks are summarized in Table 2.

Table 2: Example of resources leveraged from existing programs

Organization(s)	Collaborative Assessment of Basic Water Data Collection Tasks 2A(1-2)	Drought, Climate Change, and Natural Hazards Tasks 2C(2-3) and 5B(4)	Watershed Tools and Collaborative Planning Task 2D(3)	Federal Infrastructure Needs Task 3F-I(1)
Idaho, Wyoming, Utah			The Bear River Commission Activities	
Greeley and Fort Collins, Colorado			Halligan-Seaman Water Management Project Activities	
State of California and Yuba Co., CA		State and County Climate Change Programs		
USGS	Cooperative Water Program (CWP) and National Streamflow Information Program NSIP	CWP and NSIP	CWP and NSIP	

NOAA		National Integrated Drought Information System Program		
Reclamation	Technical expertise associated with evapotranspiration	Science and Technology R&D Program (climate change)		Aging Infrastructure Strategy Development underway
NRCS	Snow Survey and Water Supply Forecasting Program	Snow Survey and Water Supply Forecasting Program		
EPA			Targeted Watersheds Grant Program (Bear River Watershed)	
FEMA				
Corps	Western States Watershed Study	Western States Watershed Study, Silver Jackets Program, Virgin River Watershed Study	Western States Watershed Study, IWR Shared Vision Planning Program, ERDC System Wide Water Resources Program	Western States Watershed Study

PDT collaboration leveraged significant technical and monetary resources beyond those provided by the Western States Watershed Study appropriation. Table 3 (Part III.F) shows an estimate of the monetary value of these resources that supplemented study funds. The resources required to address national water resources problems and issues are high, but are made more manageable through collaboration.

C. Stakeholder Expectations

The Shared Vision Partnership Agreement defined the following framework partnership goals and expectations of the Study:

- to work together to encourage and facilitate the creation of an informal Western States Federal Support Team;
- to learn and develop effective ways to work collaboratively as federal and state organizations in support of local efforts to solve problems and maximize opportunities related to water resources;
- to develop a mutual understanding of Western States' water problems, opportunities, and values to focus on the development of mutually agreeable cost-effective solutions and approaches;
- to work together to collaboratively develop Watershed Study activities that support selected priority recommendations identified in the Water Needs and Strategies for a Sustainable Future report; and
- to work together to prepare a report in close coordination with state and local governments and other stakeholders.

This framework established the mutually agreed upon expectations of the collaborative efforts to be engaged by the multiple stakeholders. It established the intent to cooperate on a comprehensive analysis examining multi-jurisdictional use and management of water resources on a watershed or regional scale. The signatories agreed that solutions to the complex water resources problems, issues, and opportunities facing the Western States require the collaboration of local, state, tribal, federal, and other stakeholders through fostering a spirit of teamwork. Although the Corps and WSWC and the affiliated 17

Western States were the signatories, the expectations set forth in the Partnership Agreement provided the foundation to accomplish each study task and to manage the expectations of each study partner (Figure 7). A landmark achievement was accomplished for the Corps and WSWC.

Shared Vision Partnership Agreement
for,
the Western States Watershed Study

Purpose:
To promote and facilitate a long term working and collaborative relationship between participants at the State, Federal, and local levels to develop the Western States Watershed Study.

We pledge to work together as a Watershed Study Team and meet in partnering sessions as needed. We also commit to developing a subsequent collaborative action plan with specific initiatives and measurable milestones to be reviewed on an annual basis.

It is understood that this agreement supports the parties' cooperation for a comprehensive analysis examining multi-jurisdictional use and management of water resources on a watershed or regional scale. This is not a funding obligating or fiscal document. Any exchange of funds or other tangible resources in furthering the purposes of the partnering agreement will require execution of a separate written agreement in accordance with applicable law. Nothing in this agreement will be construed as affecting the authorities of the participants to act as provided by statute or regulation or as binding beyond their respective authorities or to require the participants to obligate or expend funds in excess of available appropriations.

Effective Date:
This agreement may be reviewed periodically to review the Parties' commitment and to consider changes that might be needed. Amendments will be made in the spirit of cooperation and partnership by agreement of the signatories. It will remain effective until the Parties agree to terminate it by consensus.

Chairman, Western States Water Council
Date 10/5/06

Major General, US Army
Director of Civil Works
Date

Figure 7 Shared Vision Partnership Agreement

To maintain communication and manage stakeholder and Corps project management expectations, the WSWS project manager also developed and distributed regular study update reports. These reports helped to keep PDT members and federal, state and other interested stakeholders informed on major study accomplishments, workshops, and reports (Figure 8). Furthermore, the project manager provided regular study updates/presentations at the WSWC meetings to maintain open and positive communication between the Corps and members of the WSWC. And, the study team used GROOVE, a collaborative software program that helps teams work together dynamically and effectively, sharing information useful to multiple specialized PDTs, even if team members work for different organizations.

Western States Watershed Study (WSWS) Executive Summary Status Report

Recent Significant Events/Activities (19 July – 31 August 2006) / Short-Term Action Plan

Event	Activities
19-21 July 2006 Western States Water Council (WSWC)151st Council Meeting at Breckenridge, Colorado	Ideas for the WSWS were presented and discussed. WSWS activities will focus on topics associated with high priority recommendations identified in the Water Needs and Strategies for a Sustainable Future report, released by the Western Governor's Association (WGA) and WSWC in June 2006. The study will culminate in a Report to Congress. A WGA/WSWC Team was formed and determined a multi-federal agency support team is needed along with a Partnership Agreement to encourage a collaborative process. It was decided that an appropriate role for USACE is to facilitate the initial formation of a "Western States Federal Support Team" and work with the WGA/WSWC Team and others to develop a Shared Vision Partnership Agreement (SVPA). The WGA/WSWC leadership expressed their desire that the SVPA be signed by the ASA(CW) and, to the extent possible, other federal agencies at their 152nd Council Meeting, 4-6 October 2006, at Sheridan, Wyoming. It was also decided that a final draft scope of work for implementing recommendations in the June 2006 WGA/WSWC report, that will include support WSWS activities by the Corps, will be considered for approval at the 152nd Council Meeting.
15 August 2006 Brainstorming Meeting at Salt Lake City	Meeting hosted and chaired by WSWC. Participants included representatives from WGA, WSWC, USACE, USGS, and NOAA. Work continues on the WSWS scope of work and SVPA. A follow-up meeting to finalize the draft scope is scheduled for 12 September at Albuquerque, NM

Short-Term Action Plan for the SVPA: Coordination of the working draft SVPA has been initiated with Chuck Moeslein (CECW-NWD) and Dave Shepp. Following initial review, it was decided that an incremental process to partnering would be the best approach. It is anticipated that SVPA signatories will be MG Riley; Duane Smith, Chairman of the WSWC; and a WGA representative TBD. This incremental approach was discussed during a 30 August conference call with the WSWC. The initial response from the WSWC Executive Director was positive; however, the incremental approach will still need to be considered by Duane Smith and WGA. A modified draft SVPA will be discussed and recommended at the 12 September follow-up meeting with the WGA and WSWC.

Significant Upcoming Events/Activities

Event	Notes
4-6 October 2006 WSWC 152nd Council Meeting	WSWS scope of work approved and initial execution of the SVPA
Spring 2007 WSWC 153rd Council Meeting	Will provide opportunities for further multi-agency collaboration and relationship building
Summer 2007 WSWC 154th Council Meeting	Will provide opportunities for further multi-agency collaboration and relationship building
Fall 2007 WSWC 155th Council Meeting	Will provide opportunities for further multi-agency collaboration and relationship building
Spring 2008 WSWC 156th Council Meeting and submission of Report to Congress	Report co-authored by WGA/WSWC and the Western States Federal Support Team

Cumulative Expenditures ($1,000's)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	24 Aug	Sep
FY06											59.1	
FY07												
FY08												
Totals (as of 24 August 2006)											59.1	

% Funds Expended = 7%

Figure 8: Example Study Status Report

Part II. Summary of Study Products & Brief Descriptions

As introduced above, the WSWS focused efforts on five regional water resource topics: Drought, Natural Hazards, and Climate Change Preparedness; Watershed Tools and Collaborative Planning; Federal Resources and Collaboration; Infrastructure Needs; and Policies and Programs. Summarized in Part II are the activities, findings, results and recommendations for each topic. More detailed information is available the supporting technical reports, referenced in Part IV.

A. Water Data Gathering

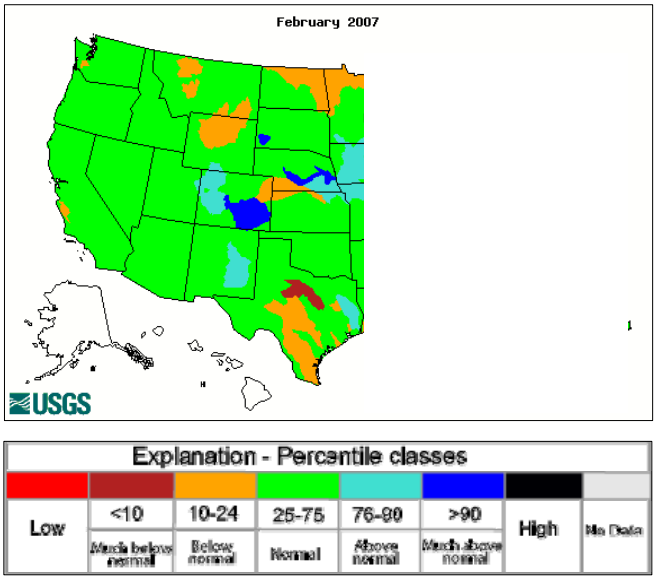


Figure 9: Precipitation in the Western States, courtesy USGS

The June 2006 Report states that there is a need for more complete and comprehensive water information to facilitate decision making. The WSWS supported an assessment of the existing status of water data gaps in the Western United States. The U.S. Geological Survey was the lead author with complimentary funding provided through the WSWS. The assessment team included the USGS for groundwater and stream flow data, the NOAA's National Weather Service for precipitation data, the NRCS for snow information and the snotel (Snow Telemetry) network, and the BOR for evapotranspiration data, including the present status of the landsat thermal band technology.

In addition to the five Federal agencies, the team included the WSWC, the Interstate Council on Water Policy, and state representatives. The Corps of Engineers coordinated the activities and facilitated discussions between state representatives and Federal agencies. As part of the water data analysis, the team sent a questionnaire to 17 Western States and Alaska asking how the states viewed water data needs and the role of the Federal and state governments. Thirteen states responded and the results of the survey were compiled.

Recommendations/Next Steps

The water data technical report provides specific recommendations on how water data collection can be improved. The Water Data Gathering PDT submits the following recommendations for consideration:

1. Develop an internet-based data portal to collect and make available the large amount of hydrologic information collected by public and private entities;
2. Contain cost increases for the operation of Federal and State stream gauging networks through continued improvements in instrument technology, data analysis techniques, and data delivery procedures; and
3. Complete a comprehensive gap analysis and network evaluation for groundwater and evapotranspiration. Information is needed for snow, precipitation and evapotranspiration data in addition to groundwater and stream flow.

These recommendations provide the foundation for a strategic plan for water data collection in the Western United States.

B. Drought, Natural Hazards, and Climate Change

Drought

The drought component of the WSWS had two objectives. The first objective was to identify and evaluate the Corps' capacity to respond to drought conditions. The Corps has a significant, but subsidiary, role as part of the overall national response to drought and drought management. The report reviewed existing Corps authorities. These authorities position the Corps to specialize in planning, coordinating and operating water management systems and emergency assistance. Their main role is primarily in the development of long-range water supplies, working with communities to develop drought contingency plans, and implementing reservoir drought contingency plans.

The second objective of the drought component was to advance federal agency participation in the National Integrated Drought Information System (NIDIS). NIDIS is an interagency effort led by NOAA. The NIDIS implementation team included representatives of the Corps, BOR,, NRCS, and USGS along with the National Aeronautics and Space Administration (NASA), U.S. Department of Agriculture, and state and university scientists.

Recommendations /Next Steps

The Drought PDT recommends the following for consideration:

1. The Corps should support NIDIS by providing drought information, monitoring and assessing drought impacts, and supporting drought planning and preparedness;
2. The Corps should supply drought information by making reservoir levels available on web sites linked to the NIDIS web portal;
3. The Corps should monitor and assess drought impacts in sectors where it has expertise, such as navigation, hydropower, recreation, and aquatic ecosystems;
4. The Corps and other Federal agencies should be more proactive in drought planning and preparedness by working with states and local authorities within an integrated watershed planning framework; and
5. The Corps should also actively participate in NIDIS pilot studies.

Natural Hazards

The Silver Jackets Program, which includes the Corps, the Federal Emergency Management Agency (FEMA), and other federal agencies involves an interagency team at the state level to develop and implement solutions to state natural hazard priorities. The Silver Jackets Program provides a formal and consistent strategy for an interagency approach to planning and implementing measures to reduce the risks associated with natural hazards. The program's primary goals are to leverage information and resources, improve public risk communication through a united effort, and create a mechanism to collaboratively solve issues and implement initiatives.
A Silver Jackets pilot program was initiated in California in 2008.

Climate Change

The June 2006 Report listed climate change as one of the challenges facing the Western States. The report noted that warming temperatures threaten to reduce the snow pack that provides a significant portion of water storage in the West. The objective of the Western States Watershed Study pilot study on climate change was to "systematically and strategically examine the extent of changes in Corps flood control rule curves that would be needed to mitigate the loss of snow pack storage throughout the West." The pilot study, built on significant climate change impact studies, was conducted by the State of California Department of Water Resources and the Bureau of Reclamation. The National Weather Service California Nevada River Forecast Center provided their computer models and support. Many California water managers from Federal, State, and local agencies and private companies participated in two workshops in spring 2007.

Three reservoirs in California were used for the pilot study: Shasta Reservoir is operated by the Bureau of Reclamation; Oroville Reservoir is operated by the State of California; and New Bullards Bar Reservoir is operated by the Yuba County Water Agency. The Corps is responsible for operating the flood storage space in these three reservoirs. Warmer temperatures in the West are causing observable changes in the hydrologic cycle such as earlier spring snow melt and an increasing fraction of annual runoff occurring in winter with a corresponding decreasing fraction occurring in late spring and summer. Consequently, with more rain and less snow in winter, more flood storage space may be

needed in winter. The earlier snow melt may require beginning the spring refill earlier to ensure a full reservoir for summer water supply. The pilot study did not resolve whether a modification of flood rule curves for operating reservoirs is appropriate.

Recommendations /Next Steps

The Climate Change PDT recommends the following for consideration:

1. Build flexibility into existing operations for adapting to a changing climate.
2. Systematically update reservoir operating and drought contingency plans including a review for how adequately operations can be adapted to a changing climate.
3. Monitor snow and water conditions, and support more research opportunities which may lead to improved forecasts as applied to efficiency in reservoir operations.

C. Watershed Tools and Collaborative Planning

The importance of collaborative water resource planning is recognized by the WSWC and other organizations such as the American Water Resources Association (AWRA). Participants of the Third National Water Resources Policy Dialogue, conducted by the AWRA, believe that organizing our water resources goals, policies, and rules around the concept of "places" (i.e. basins or watersheds) is a common-sense way of improving collaboration. Watershed tools, instruments that assist in the management of a watershed, are an essential integral component of collaborative planning.

Many effective watershed management and collaborative planning tools are being used in the West. This activity focused on Geographic Information Systems (GIS)- specifically the SWWRP ArcGIS Toolbar and CorpsGlobe, Multi-Criteria Decision Analysis, and Shared Vision Planning. These new innovative tools augment existing tools. Study activities provided the opportunity to demonstrate these tools to federal, state, tribal, and local governments, investigated technology transfer options, and identified ways to improve federal, state, and local collaboration of water resource management. These activities included two pilot projects in the West, the Bear River Watershed and Halligan-Seaman, developing a Section 404 Permit Information Pamphlet and Pilot Flowchart, and exploring technology and information transfer through participation at several conferences/meetings. From these activities, the study team developed a Strategic Plan for the technology transfer of Shared Vision Planning (SVP) and the SWWRP GIS Toolbar technology to others, and the application of the SVP process and SWWRP GIS Toolbar technology to the Corps Section 404 regulatory process. Supporting documentation for this task included the individual reports generated from each pilot study activity (i.e. "Application of the Shared Vision Planning and GIS Tool Bar to the Bear River Watershed, A Case Study" and "Application of the Shared Vision Planning Process and Model to the Halligan/Seaman 404 Permit Action")..

Recommendations /Next Steps

Although this plan focused on two tools, many additional Corps' tools and resources are available to the states and their partners. States and partners such as river basin commissions have a wide variety of watershed tools in use or available to them. As learned

from the pilot studies, tools that enhance data communication are desirable, but need to be compatible with existing and planned capabilities. Tools for data provisioning, such as the toolbar and CorpsGlobe, can be tailored to locally used tools and can add capability for intrastate and interstate communications. Likewise, communication tools such as SVP can also facilitate increased communication. A key to successful implementation is to spend more time identifying and understanding tools already in place, identifying gaps, and working with local interests to fill the gaps.

The Corps and other agencies, as well as academic institutions and non-government organizations have a wide variety of tools that can be utilized in watershed studies and planning activities. These tools include planning tools, data management tools, assessment tools, simulation and forecasting models, and visualization technologies. All of these tools allow for opportunities to collaborate among interested parties. While collaboration is often thought of in terms of alternative analysis or conflict resolution, working together to build assessment tools (e.g., GIS databases), simulation models (such as numerical runoff models), or visualizing model output (e.g., animations or maps) are all examples of collaboration.

The Corps maintains a suite of tools that can be used in watershed studies. The Hydrologic Engineering Center (HEC) tools are utilized nationally for water control and riverine habitat assessments associated with operations. The Engineer Research and Development Center (ERDC) focuses on multi-dimensional tools that work with HEC tools or independently to address not only water quantity but water quality and habitat in multiple dimensions. A variety of GIS-based tools exist as well for spatial assessments using empirical, qualitative, and quantitative inputs. These tools provide approaches at various levels of difficulty for screening and planning applications to rigorous and complex forecasting and design applications. The tools are available for use and should be considered at any stage of a watershed study. More information on these tools can be found at (HEC website) and https://swwrp.usace.army.mil.

D. Federal Resources and Collaboration Initiatives

To maximize the effectiveness of expertise, technology, policy, programs and limited budgets, leveraging of federal and non-federal resources to address water resource issues in the West is essential. This activity focused on providing information regarding federal and state collaboration in support of locally led watershed initiatives, including identification of governance, policy and institutional issues and their resolution relevant to collaboration. This information was then used to develop recommendations to improve federal, state, and local collaboration.

To accomplish these objectives, the PDT identified and completed four tasks: 1) draft and implement a Shared Vision Partnership Agreement between the Western States and Corps; 2) Assess a sample of collaborative watershed programs and strategies to identify information useful to future federal-state collaboration in support of locally led watershed efforts in the West; 3) investigate the interest of, and utility for, a formalized Western States Federal Agency Support Team (WESTFAST) and federal liaison position; and 4) if

applicable, develop a collaborative action plan to support the formation and goals of WESTFAST in support of the Western States strategies.

The Assessment of Collaborative Watershed Programs and Strategies revealed information on a range of topics that may be useful for future federal-state collaboration in supporting locally led watershed efforts, depending upon specific circumstances. Eight initiatives of different scopes and scales from around the country were examined. Additional information was derived from literature and personal communication. The analysis identifies elements of collaboration in watershed planning, including topics such as: definition of collaboration, leadership and authority, visions of watershed problems and opportunities, and goals and objectives, roles, responsibilities and accountability, organization and structure, processes and funding.

Summary of Effort and Findings

The task activities described above indicated the following findings. Detailed information about each of the eight watershed initiatives examined can be found in the report appendix.

- Leadership should not be viewed as the sole planning, decision-making, or implementing body, but often serves as a contact and conduit for organizing the interactions and collaboration with multiple groups, stakeholders, and players.
- Lead agencies should not be viewed as the sole planning, decision-making, or implementing bodies. Depending on the circumstances, they may serve as contacts and conduits for organizing the interactions, and coordinating the implementation of interrelated plan components across multiple groups, stakeholders, and players. They may also provide mechanisms for reconciling technical and policy issues.
- Shared visions help partners recognize their interdependence and provide foundations from which to move forward to address watershed needs and opportunities. *Shared science and technical analysis* can provide a common baseline for productive debate among parties with interest-based differences. Collaboratively acquiring and examining new data and information can help stakeholders dissolve misconceptions, and enable them to work through differences.
- Identifying and mutually understanding partner roles, responsibilities and bounds helps in coordinating and leveraging of expertise and capabilities in watershed planning and project implementation. Mutually understanding these roles, responsibilities and bounds can also help alleviate misconceptions and misunderstandings that hinder the development of viable solutions.
- Roles and responsibilities are often influenced by legal or jurisdictional mandates/ responsibilities, human expertise, and financial resources and responsibilities.
- There is no single “door to the Federal government” or “door to the States” through which locally led watershed initiatives can tap this assistance. As a result, local initiatives expend considerable energy accessing assistance.
- Watershed groups provide and channel “grassroots” support from the public for watershed initiatives. They can “explain” the process from the public’s perspective, and provide a mechanism to organize and incorporate volunteer efforts. Federal efforts should not under-appreciate them.

- Dividing the watershed effort into smaller, more manageable regions or focus areas can make the work more manageable. However strategies are needed to re-integrate these smaller components back to the watershed scale. Responsibilities vary across watershed plans.
- Funding and financing: Different entities can fund different components of a watershed plan, and creative use of multiple sources may be possible. Some of these could include: public funds, donations, endowments, grants, investments, and mitigation fees.

The report from this analysis can serve as "resource information" for establishment of the WESTFAST, along with shaping specific federal-state collaborations in supporting locally led watershed initiatives.

Collaborative Action Plan

The concepts of formalizing a WESTFAST and a WSWC Federal Liaison Officer Position were favorable to those agencies participating on the PDT and the WSWC. Senior Leaders in several Federal Agencies have begun efforts to establish the WESTFAST and Liaison position. The Federal Agency and Collaboration PDT believes the members of the WESTFAST should develop a "collaborative action plan" to implement WESTFAST support of the WSWC. The intention is to help participants establish ownership, commitment, and shared vision of the final plan. To assist in these efforts, the PDT developed information that may be useful in developing the WESTFAST "plan." Furthermore, this information provides recommendations for Corps participation in collaborative efforts through the WESTFAST, once the WSWS is complete. It also includes templates that WESTFAST may want to use to develop their program or project management plan and partnership agreement, questions for consideration, and other information.

Recommendations /Next Steps

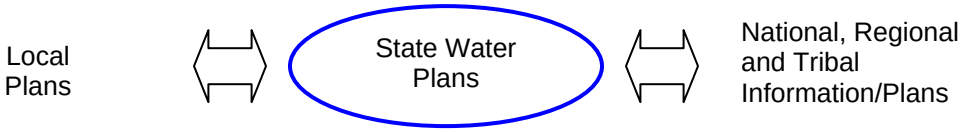
The Federal Resources and Collaboration PDT recommend the following for consideration:

1. Formalize the WESTFAST through an inter-agency partnership agreement or other method. Once established, the WESTFAST working with the Federal Liaison, should develop a written strategy and charter for interagency collaboration, and their collective support of the WSWC current and future priorities.
2. This study found there is a lack of clear budgetary authority for many federal agencies to participate in inter-agency tasks. An early WESTFAST task should address how funding can be leveraged for each agency to support WESTFAST initiatives.

E. Programs and Policies

The overarching principle of the WSWC and likewise the Western States Watershed Study is that states maintain a pivotal role in the grassroots approach to water resources planning and project implementation. Typically, state water plans must address problems and opportunities at various planning regions and watershed scales inside and, as necessary,

outside state political boundaries. An important role of federal agencies is to provide appropriate collaborative support for this approach.

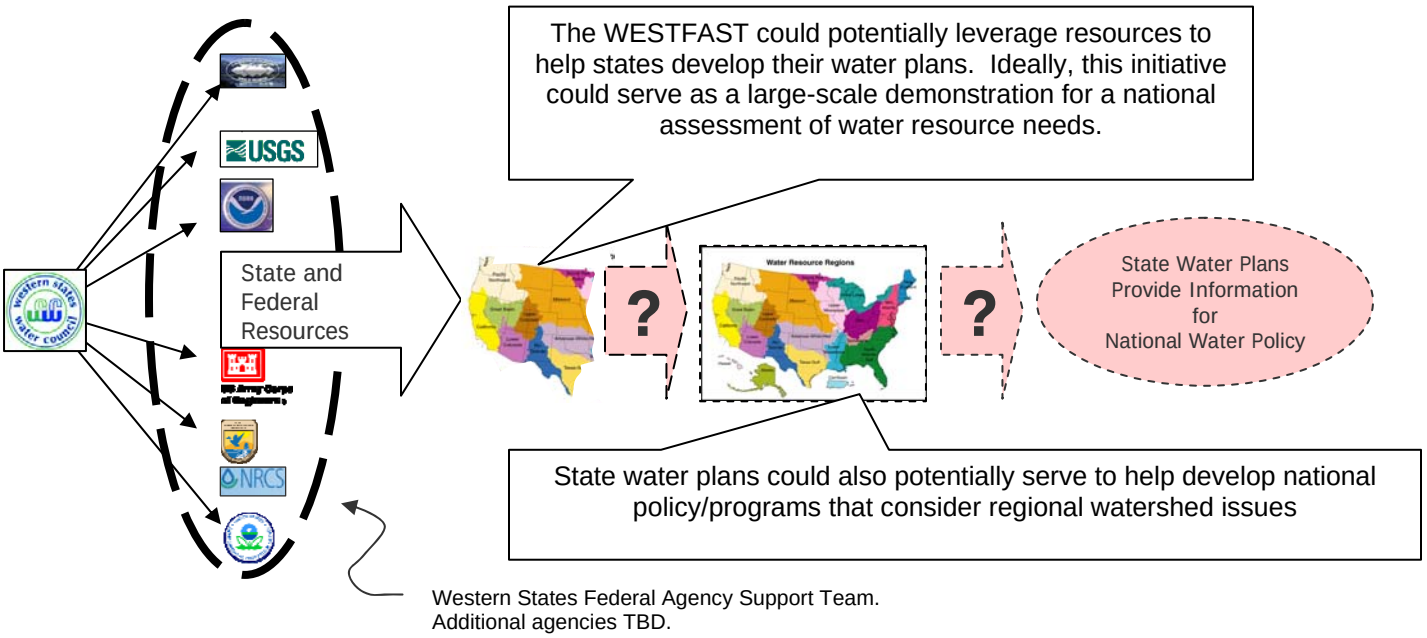


Programs and Policy Study Objective.
The objectives of the Western States Watershed Study of Program and Policy initiatives were to mirror the WSWC approach of promoting the shared development of solutions to regional problems, identify ways to leverage existing programs (internal and external to the Corps), and present ideas to leverage future programs to address high priority regional initiatives of the Western States.[2]

Systems Approach
Examples of high priority issues important to the Western States include topics associated with water data collection, drought, climate change, watershed tools and collaborative planning, and asset management. These regional issues, and others, are important in the development of state water plans that typically include the following interacting framework components: 1) demand projections, 2) supply and gap analysis, 3) identification and evaluation of supply alternatives and, 4) state policy development. Collectively, state water plans, could potentially contribute significantly to a national assessment of water resource needs.[3] Since state water plans are periodically updated, the national assessment could also be periodically updated in the future. The initial national assessment and updates could potentially be used to help develop national water policy that is adaptive and responsive to changing needs. Federal programs that address regional issues and provide planning assistance to states could contribute to this collaborative effort.

The WSWC provides a venue for Western States and federal collaboration on regional issues and state water plans in the West. The WSWC desires that federal agencies leverage programs, policies, and authorities to provide more comprehensive support to the implementation of WSWC initiatives, instead of each agency providing its resources to the Council independently. Therefore the WSWC is an advocate of formalizing a Western States Federal Agency Support Team (WESTFAST) and creating a WSWC Federal Liaison Officer position. These initiatives build on the goals of the October 17, 2006 Western States Watershed Study Shared Vision Partnership Agreement between the WSWC and the Corps.

[2] Many federal water resource programs also significantly contribute to local efforts. The scope of the Western States Watershed Study, however, was to place more emphasis on developing strategies to work with states in a manner that would address regional issues and also benefit local efforts.
[3] Several organizations (i.e. American Water Resources Association) have expressed support for a national assessment of water resource needs which should begin at the state and local level and be backed by appropriate support from the federal government.



Recommendations/Next Steps

The Programs and Policies PDT recommends the following for consideration:

1. In addition to working with the WSWC on regional challenges, leveraged resources of the WESTFAST should be used, as requested, to help states develop their water plans. The effort could be conducted in a manner that provides a large-scale demonstration for a national assessment of water resource needs.[4]
2. State water plans should be used by decision makers to help determine national policy and priorities that best align federal agency support to states and take into consideration regional watershed issues. In the future, national policy could be periodically updated based on the periodic updates of state water plans.
3. Contingent on federal agency and Western States approvals, the WESTFAST and WSWC should collaboratively develop strategies to continue implementation of selected recommendations of the June 2006 Water Needs and Strategies for a Sustainable Future Report as well as other identified regional challenges.
4. Several policy-related issues identified by the WSWC should be considered by the WESTFAST. Those issues include: A) water and wastewater infrastructure, B) sediment in reservoirs, C) asset management challenges associated with irrigation districts.

F. Federal Infrastructure Needs

Because of the importance of sustaining federal infrastructure for the benefit of current and future generations, the Western States Water Council (WSWC) is an advocate of ongoing

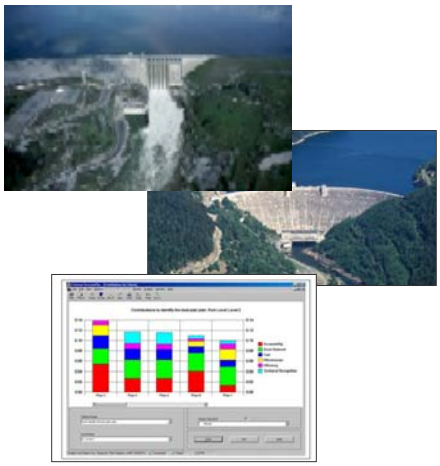
[4] Concurrent with a large-scale demonstration of a process to help Western States develop their plans / conduct a national assessment, federal agencies and states should consider a collaborative Eastern United States Watershed Study. The study objective would be to help strengthen federal/state collaboration and set the stage to continue the national assessment of water resource needs initiated in the West.

and future collaborative Asset Management initiatives by federal agencies and others. Asset Management is the art of managing the life cycle cost of infrastructure assets with innovative and adaptive strategies to ensure those assets continue to provide value to the nation and meet expected levels of service while mitigating risk.

Asset Management Study Objective.

The objective of the Western States Watershed Study of Asset Management initiatives was to identify potential common areas of interest shared by BOR, the Corps, USEPA Office of Water, and the Western States. BOR and the Corps have responsibilities for similar types of structures, such as reservoirs, and the EPA is an advocate of advancing Asset Management technology and understanding because of the millions of dollars they have invested in water and wastewater infrastructure. Western States have an interest in the long-term sustainability of federal reservoirs and how those resources contribute to their state water-planning initiatives. States also consider Asset Management in their planning and policy processes.

Potential Shared Vision Corporate Models and Processes.



BOR is implementing their *Management for Excellence* Team recommendation to adopt a quantifiable prioritization framework for operation and maintenance that is used BOR-wide in its Budget Review Committee process and is flexible enough to accommodate special situations. Likewise, one of the four pillars of the Corps' *Actions for Change* initiative is to effectively implement a comprehensive systems approach in employing risk-based concepts for operations and major maintenance. Based on the initial observation that the goals of BOR and the Corps are similar, there could be potential common areas of interest in the development of corporate models and processes to prioritize Asset Management needs. It is anticipated that selected lessons learned through the BOR and Corps dam safety programs and other relevant agency activities[5] could be applied to assist in the development of risk-based prioritization models and processes.

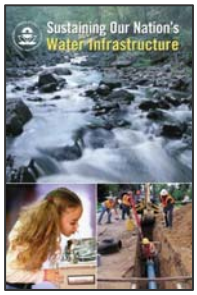
Systems Approach

As future Asset Management technology and policies develop, opportunities may be identified to extend the life of reservoirs. In addition to prioritizing maintenance needs, it is envisioned that future long-term Asset Management decisions associated with some reservoirs will also utilize information from studies and assessments associated with the

[5] An example is the Corps' Facilities and Equipment Maintenance System (FEMS). FEMS is a computerized maintenance management system.

following: 1) storage reallocation and/or system operation changes, 2) Regional Sediment Management[6] and, 3) climate change.

Potential Venue for Future Collaboration



The USEPA Office of Water has indicated an interest in collaborating with BOR and the Corps on future Asset Management initiatives. Through their Sustainable Water Infrastructure Initiative (SI), USEPA is working as an advocate and sharing information on best practices, tools, innovative technology, and research. USEPA's SI program provides an opportunity for leveraging resources to advance Asset Management technology for federal, state, and local organizations. Collectively, this information from multiple stakeholders could be used to help make collaborative Asset Management decisions in the future and contribute to the development and implementation of state water plans.

Recommendation / Next Steps

The Asset Management Study Team recommends the following for consideration:

1. Continue the ongoing collaboration between BOR and the Corps regarding Asset Management common areas of interest. Determine if there are potential opportunities to leverage resources in the development of prioritization models and processes that could then be refined and used by each agency independently.
2. Consider a pilot case study/research on a systems approach that would include prioritizing aging reservoir infrastructure, reallocation and/or system operations, Regional Sediment Management,[7] and climate change scenarios.
3. Consider potential opportunities to leverage USEPA's SI program to advance Asset Management technology for federal, state, and local organizations.
4. Consider the development of a communication plan to include strategies for periodic collaboration with the WESTFAST / WSWC and other stakeholders.

G. Collaboration with Native American Tribes

"Our Nation has long recognized the sovereign status of Indian tribes. The United States Constitution specifically addresses Indian sovereignty by classing Indian treaties among the "supreme Law of the land," and establishes Indian affairs as a unique focus of Federal concern. Principles outlined in the Constitution and treaties, as well as those established by

[6] The objective of the Regional Sediment Management (RSM) approach is to achieve more effective management of dredged material and other sediment resources through regional management strategies that link the management of Corps projects within a sediment system, with one another, and with activities of other Federal agencies, State, and local governments. Additional information on RSM can be found at http://www.iwr.usace.army.mil/inside/products/proj/factproj.cfml?projid=96

[7] A potential RSM initiative could include an updated analysis of sediment volume and distribution in reservoirs followed by estimates of their remaining life relative to storage of water supply and other purposes. This information could be used to help identify alternative plans and contribute to a national assessment of water resource needs.

Federal laws, regulations and Executive Orders, vest in Tribes a singular legal position complimentary to the relationships among the various states and the Federal government."8

A watershed approach requires collaboration between multiple governmental jurisdictions involving federal, state, and tribal agencies. The necessity of one-on-one collaboration with Tribes is clear regarding projects and programs associated with specific geographical areas; however, collaboration with Tribes on regional water resource topics and issues is equally valuable. Western Tribes are critical to addressing water resource challenges because of their unique legal and resource rights, strategic locations, and their ability to offer alternative paradigmatic approaches to problem solving.

Tribal Collaboration Study Objective

The objective of the WSWS for potential collaboration with Native American Tribes was two-fold. The first objective was to outline a communications/outreach plan that will familiarize Native American Tribes with WGA and WSWC initiatives and promote potential inter-governmental collaboration. The second objective was to suggest strategies through which the WGA, WSWC, and Native American Tribes may leverage their individual initiatives into a more effective collaborative effort.

Communication/Outreach

"Listen or your tongue will keep you deaf"[9]

Tribal governments share with Federal agencies and States the challenges of data collection, management tools, drought, climate change, planning and asset management presented elsewhere in this report. Tribal lands are frequently located in geographic positions strategically valuable if not critical to the development of solutions to resource challenges. These shared challenges and crucial positioning provide a nexus of common interest that may be exploited by all parties to their mutual benefit.

Effective communication and decision-making parity are essential for collaboration with Native American Tribes. Successful communication with tribes results from a carefully considered and executed communication and outreach plan. Such a plan involves the tailoring of the type and detail of information with specific communication opportunities. A first step in any collaborative undertaking is the effective distribution of program-related information. It's impossible to interest potential partners in an effort if they are unaware of

[8] Policy Guidance Letter No. 57, Indian Sovereignty and Government-to-Government Relations With Indian Tribes, CECW-AG, 18 Feb 1998

[9] Native American saying.

the program's existence. Native American tribes, in particular, may be significantly uninformed about non-Indian initiatives. Mass mailings of information are almost completely useless in communicating with organizations that receive scores of such mailings daily and cultures wherein personal relationships and contacts are crucial. The message is simply lost in the traffic. On the other hand, individual contacts with Tribes are expensive and time-consuming and are more generally effective at later stages of partnering when a particular Tribe has expressed interestin a specific undertaking.

Numerous professional, educational and governmental conferences sponsored by Native American organizations are commonly attended by representatives from dozens, if not hundreds, of Tribes. As such, they are extremely efficient avenues to provide a target constituency with initial broad-based information. Perhaps the best single venue for familiarizing the greatest number of tribal executives with a program or initiative is participation in the annual meetings of the National Congress of American Indians (NCAI). More numerous events like conferences sponsored by the National Tribal Environmental Council (NTEC) or Regional Environmental Conferences sponsored by the Environmental Protection Agency and occasionally the Department of Defense provide opportunities for contacts with Tribal staffs and resource managers.

Sub-regional organizations of tribal governments are equally suitable for initial contacts, but also for more detailed program information. Tribes in the west commonly cooperate in quasi-governmental partnerships with other tribes. These organizations may be organized within a geographically larger state (i.e., Alaska Inter-Tribal Council or Council for Native Hawaiian Advancement) or more often within geographic or cultural regions. In New Mexico, for example, organizations such as the All Indian Pueblos Council, Eight Northern Indian Pueblos Council and others provide unique opportunities to brief numerous senior tribal leaders on upcoming initiatives. These 'second tier' tribal organizations provide the prospect of the personal contacts with the leaders of individual tribes. Development of these personal relationships is essential to further the goal of sustained tribal cooperation.

WGA and WSWC conferences and workshops specifically targeted to Native American Tribes would provide significant opportunities for Western States and tribes to develop inter-governmental partnerships for regional water resource topics and issues. An initial step would be the organization of a session with the topic of "Traditional knowledge in water resources planning." The session, sponsored by the Western States Watershed Study, would involve discussions by Tribal presenters on the issue. Such an event would immediately gain the attention of Native American governments to the WGA and WSWC and their initiatives. Subsequent meetings in second tier venues or with individual tribes could then use the presentations as a 'springboard' to more specific individualized discussions.

A pilot activity to promote collaboration with multiple tribes consisted of participating in the 30 April – 4 May 2007 National Tribal Environmental Council Conference in Albuquerque, New Mexico, and the 14-17 NTEC Conference in Santa Fe, New Mexico. NTEC has tribal membership from 16 of the 17 Western States and serves as a clearinghouse for information on a variety of resource topics and challenges. Following an

assessment of the Team's collaboration activities at the NTEC Conference, a summary report was prepared to identify venues where the "Western States Federal Agency Support Team" agencies could potentially collaborate with multiple tribes to discuss regional water resource topics in the future. This summary is included in Part IV of this report.

Collaboration

"... I have seen that in any great undertaking it is not enough for a man to depend simply upon himself."10

The goal of the communication and outreach effort discussed is to inform Tribes of potential collaborative opportunities. There exist several valuable advantages to collaboration:

A group is more credible, influential, and capable in accomplishing objectives than a single entity

Collaboration encourages a comprehensive approach, reduces duplication

Collaboration ensures that all voices are heard: successful collaborations involve all relevant stakeholders

Collaboration creates sustained change and will have an impact beyond individual projects producing new collaborative opportunities.

While there is no general theory of collaboration there are some generally recognized principles of effective collaboration, which are listed below. Above all, collaboration is the result of a deliberate process relying on mutual respect and decision-making parity.

Shared perceptions: Agreement on a set of common goals and principles

Reciprocity: Successful collaborations should provide direct benefit to participants

Belief in Collaboration: Those involved must believe that more can be achieved by working together than working alone, and bring this perspective to the dialogue.

Institutional Relationships Rather Than Individual Relationships: While effective collaboration is often a function of the personal relationships of individual participants, successful long-term results demand institutional commitments to the collaborative process.

Transparency/Trust: Transparency and Trust are synergistic: Open and honest expression of aspirations and expectations ensure ongoing review and evaluation. Real transparency takes time, energy and a desire to build a sense of trust and respect. Trust develops through time resulting from frank, open, and regular communication. While complete agreement on all issues is not required, consistency and honesty are.

Established Collaborative Structure: There should be a clearly defined leadership structure, a shared understanding of the leadership structure, and a mechanism to regularly communicate.

In a process similar to the one which resulted in the formation of the WSWC itself, the WSWC would develop broad partnerships with Tribes or consortiums of Tribes to address regional watershed challenges. The focus of these collaborative efforts could be limited to specific resource challenges (i.e., drought management) or more broadly address multiple water resource issues.

[10] Lone Man (Isna-la-wica)(Teton Sioux).

Because of the unique Tribal/Federal government relationship, the proposed Western States Federal Agency Support Team (WESTFAST) could fulfill Federal Native American Trust responsibilities while providing comprehensive support to the implementation of WSWC initiatives. Such a Federal 'nexus' could emphasize the role of WESTFAST as 'facilitator' rather than 'driver' in the process of solution development.

Recommendations/Next Steps

The potential benefits of widened collaboration with Native American Tribes recommend the implementation of a communication/outreach plan with intergovernmental collaboration on water resource challenges as its goal.

Outreach will produce inquiries. It is suggested that WSWC and WESTFAST review their respective policies and organizational structures to identify the appropriate tools and processes needed to efficiently and effectively manage communication /outreach products (i.e., comments or other input on proposed initiatives or requests for collaboration).

The WSWC should promote an internal dialogue to establish its goals with respect to Tribal or other collaborative endeavors. What should be the focus areas of collaborative effort within the broad principles of the WSWC's Mission Statement?

Part III. Conclusions and Recommendations

A. Study Conclusion

- Study efforts showed improved federal collaborative support of state, tribal and local jurisdictions and their resource agencies in multi-jurisdictional integrated water resources management efforts as demonstrated by:

    1. Desire for formation of a WESTFAST and liaison position to work with the WSWC to support state efforts;
    2. Use and adoption of a shared vision philosophy to lead study efforts;
    3. Five federal agencies working with state water managers to identify water data needs and gaps;
    4. Corps, BOR, and NWS-RFC working with California and local water managers to evaluate reservoir flood storage rule curves under a changing climate; and,
    5. Federal agency collaboration in the WSWS encouraged other Federal agencies, such as the U.S. Forest Service, to work closer with WSWC.

- Study efforts resulted in improved understanding of the federal agency roles by the Western States Water Council and 17 Western States in water resources management from state, tribal and local jurisdictions. Improved integration and multi-jurisdictional management of water resources were shown by:

    1. Agency roles were selected based on agency expertise. For example, USGS evaluated surface water and groundwater needs and gaps, NRCS completed snow monitoring, NOAA-NWS completed precipitation, and BOR completed evapotranspiration;
    2. The study identified a need to better integrate water data collection and archiving among federal agencies, state, and local water data collection;
    3. The shared vision partnership agreement identified the roles of the Corps and States and developed a framework to work collaboratively to solve problems and maximize opportunities related to water resources;
    4. Conferences were held to encourage collaboration between the Corps, BOR, EPA, USGS, NOAA, NRCS, the National Tribal Environmental Council, the National Association of Counties, and the Council of State Governments;
    5. A Corps-BOR Senior Leaders Collaboration meeting was held;
    6. Two Planning Ahead Articles,[11] dated December 2006, and September 2007 were published;
    7. A strategic plan was developed for future federal and state collaborative activities to address aging infrastructure challenges.

- Study efforts resulted in greater participation of federal, state, and university technical specialists in non-federally directed water resources initiatives, such as comprehensive water planning. The increased participation of non-federal entitities was shown by:

[11] Corps of Engineers, quarterly publication

1. Adoption and improvement of the GIS toolbar by Utah State University in collaboration with the Bear River pilot study;
2. The states of Texas and Idaho expressing interest in utilizing the GIS toolbar in state water planning efforts;
3. The WSWS responding to the needs identified in the June 06 report, which involved technical specialists from federal entities and states (the WSWS was non-federally developed). Needs were identified by the Western States;
4. The Study philosophy matched that of a Corps Planning Assistance to States study;
5. Personne at the Engineer Research Development Center and the Institute for Water Resources acted as technical team leaders in partnership with lead planners from Corps districts; and
6. The basis and motivation of the study itself were a desire by the Corps to respond to and support the efforts of the WGA and the WSWC to implement the recommendations in the 2006 report. The multi-agency PDTs, consisting of federal, state and tribal representatives, were an important dimension of this effort

- Study efforts established priorities for water resources planning and investment in coordination with states, tribal and local jurisdictions, and federal and non-federal water managers, as shown by:
    1. Study topics, including water data, drought, climate change, tools, shared vision planning, and water infrastructure needs (asset management), will remain priority issues beyond the study. (See recommendations in the WSWC report to the governors)
    2. New investments needed for water data collection and for a water data portal; and,
    3. Recommendations for policy changes (Parts II E and III E).

- Study efforts demonstrated collaboration within federal agencies and the WSWC to bring programs and resources together and provided integrated solutions as demonstrated by:
    1. Deployment of a GIS toolbar as a prototype approach for data sharing within an interstate watershed in collaboration with the Bear River Commission and Utah State University;
    2. Identification of water data needs and gaps, and need for a National water data portal and web sites for water data sources;
    3. Identification of a needed pilot study and more flexible reservoir rule curves to adapt to a changing climate;
    4. Contingency planning and federal water agency support for implementation of the National Integrated Drought Information System (NIDIS);
    5. Application of shared vision planning in addressing managed flows in Halligan and Seaman Reservoirs;
    6. Delivery of the GIS toolbar to Greeley and Fort Collins planners and Corps Omaha District Regulatory group for the Halligan and Seaman Reservoirs study; and

7. Leveraging of funding and resources from multiple agencies to deliver products as shown by the work of the specialized PDTs

B. Study Challenges

The PDT faced multiple study challenges including the following:

- Multiple tasks to study and multiple participants and PDTs;
- Determination of how each task fit into the total perspective of the study;
- WSWC tasks had to be limited to meet funding and time resources constraints of the study;
- Although the PDT had opportunities for face-to-face interactions through the WSWC regular meetings, the uneven maturity of certain tasks made it difficult to get feedback when needed, if the timing did not correspond to a regularly scheduled meeting.
- WSWC members do not always speak with one voice and had different views on the federal role;
- States had different levels of capabilities and experience in water resources planning;
- State and federal agencies initially had very divergent views on water data collection;
- Substantial lag time in getting the PDTs underway;
- Communication difficulties arising from virtual teams – conference call communication vs. in person;
- PDT members each had their own lingo, depending on the agency, state, or group;
- PDT members used different funding sources to participate; it was difficult having expectations for participation without a comprehensive understanding of the funding authority.

C. Lessons Learned

The PDT identified lessons learned, including:

- State water resources agencies and their federal partner agencies can effectively work together as equal partners;
- Partnering efforts need to show interim products and results;
- The federal role is to support regional, state, and local roles in state and interstate water planning activities;
- Flexibility is needed in team communication. Depending on personalities and subject matter, some teams required face-to-face communication, while others could work virtually;
- With limited funding, leveraging resources from other agencies is key to successful completion of the watershed study. However, resource leveraging is difficult to coordinate and consideration should be given on how to improve the ownership of the outcomes of the watershed study, by all partners, at an earlier stage in such an effort;
- Utilizing existing venues helped to get the right people together for meetings and to share limited resources;
- The collaborative effort requires a facilitator; and

- Individual state needs vary. Federal agency planning and implementation support needs to be situationally applied.

D. How Will Collaborative Efforts Continue?

The PDT identified the following efforts that will continue beyond the study period:

- Federal Agency Liaison position to the WSWC;
- Establishment and participation of the Western States Federal Agency Support Team;
- Future workshops are being planned in California to address climate change and the need to develop new methods to estimate probability and magnitude of future droughts and floods;
- Climate Change and Western Water Workgroup started by NOAA, BOR, and USGS and joined by the Corps to develop common understanding of research needs for water resources decision making and planning;
- Corps will work with Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) on a data portal prototype;
- Corps and BOR will continue to work together on asset management; and,
- Senior leaders of the Corps, BOR, and USGS will meet periodically to discuss water resources issues of mutual concern.

E. Study Recommendations

An overarching long-term recommendation of this study is to continue initiatives, such as those discussed in this report, to advance federal agency support to improve the effectiveness of collaboration between and among federal, state, and tribal agencies in implementing a watershed approach. An efficient and effective way to achieve this goal involves the formation of a WESTFAST, consisting of representatives from each Federal Agency, who attend WSWC meetings and provide access to agency resources and technology.

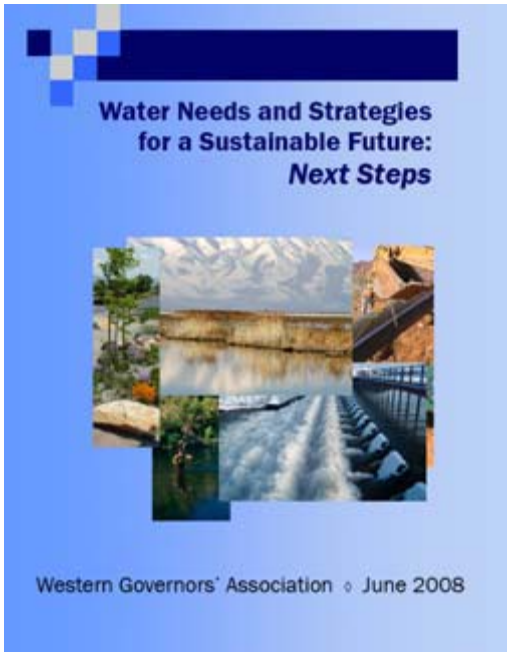


Figure 10: WGA/WSWC June 2008 Report, with Recommendations from the WSWS

The WSWC, provided proof of concept of the need and utility for a WESTFAST. The WSWS also demonstrated the critical need for a team leader, who is supported in this position by its members. Appointment of a Federal Liaison as the director/project manager of the Team must accompany the development of a WESTFAST; this person would be critical to maintaining communication between the WSWC and staff and members of the WESTFAST. The Federal Liaison will be accountable to the WSFST and the WSWC for work that is identified.

Study results provide several key recommendations to address each of the study topics. These recommendations are summarized in

the individual technical supplemental reports listed in Part IV A. From these recommendations, the WSWC selected several to include in their report to the Western Governors, *Water Needs and Strategies for a Sustainable Future: Next Steps, June 2008*. These recommendations are compiled in the technical supplement document, *Recommendations from the Western States Watershed Study adopted by the WSWC/WGA and included in their 2008 Report*.

F. Evaluation Metrics

One of the goals of the October 2006 Western States Watershed Study Shared Vision Partnership Agreement was: "To work together to collaboratively develop Watershed Study activities that support selected priority recommendations identified in the Water Needs and Strategies for a Sustainable Future report released by the WGA and WSWC in June 2006." Intuitively, collaboration makes sense but the development of metrics is needed to help decision makers and others predict watershed study accomplishments, measure completed accomplishments, and prioritize future follow-on initiatives. As more watershed studies are accomplished, metrics will evolve and be standardized but it was desired by Corps senior leaders to begin this process for the five national watershed studies. The following are some metric concepts developed as part of the Western States Watershed Study.

Preliminary metrics that could indicate the potential success of a collaborative effort are: 1) the anticipated/actual leveraging of multi-organization resources, and 2) anticipated/actual sustainability of the effort and follow-on initiatives. Typically, organizations are more likely to invest resources on initiatives that are anticipated to be "value added." If the initiative was successful, then participating organizations would tend to continue their contributions of resources for follow-on activities. However, if organizations initially invest in activities that are not successful, then they will likely discontinue their participation unless changes are made based on lessons learned.

The Western States Watershed Study helped provide a pilot demonstration of a Western States Federal Agency Support Team (WESTFAST) concept. This demonstration consisted of several federal agencies working collaboratively with the WSWC to accomplish some of the recommendations contained in the June 2006 Water Needs and Strategies for a Sustainable Future report. A conceptual metric of the leveraging of multi-organization resources to accomplish these recommendations is referred to as the Resource Leveraging Factor (RLF) and is illustrated in the following Table:

Table 3: Resources leveraged from multiple sources

Organization	Example (rough estimate) Funding / Work-In-Kind Contributions
Federal Agencies (Western States Federal Agency Support Team)	$1,000,000
Non-Federal Organizations (WSWC staff and members	$1,000,000

participation)	
Total WSWC / WestFAST Contributions	$2,000,000
Corps of Engineers' Western States Watershed Study (WSWS) Contribution	$830,000
Corps' WSWS Resource Leveraging Factor (Total÷Corps' WSWS Investment)	2.4

In the future, it may be desirable for the Corps and other stakeholders to proactively estimate RLF's prior to initiating collaborative activities. Additionally, the RLF concept could be applied in other ways. For instance it may be desirable for the WESTFAST to measure the leveraging of non-federal resources relative to the WESTFAST contribution. In this example, and using the illustrative values in Table 3, the RLF = $2,000,000 (Total investment)÷$1,000,000 (WESTFAST investment) = 2.

The second component of the metric indicators of the potential success of a collaborative effort is sustainability. The WESTFAST initiative will likely have near-term and potentially long-term sustainability due to the anticipated August 2008 Declaration of Cooperation signing by BOR, USGS, the Corps, Forest Service, NRCS, EPA, NOAA, BLM, and USFWS. Additionally, it is anticipated that a WSWC Federal Liaison Officer will be selected in August 2008.

Collectively, the conceptual RLF and anticipated follow-on initiatives are preliminary metric indicators that the Western States Watershed Study was a successful collaborative effort that contributed to the development of potentially sustainable follow-on initiatives in the West.

Part IV. Lists of Technical Reports, Project Team Leaders, Project Delivery Team Members

A. List and Location of Technical Reports produced during the study

All Reports will be available at: http://www.usace.army.mil/cw/cecw-cp/index.html.

Shared Vision Partnership Agreement, October 2006
Applying the Shared Vision Planning Model and GIS Data Management Tool to the Bear River Watershed, July 2008
Western States Watershed Study Report on Asset Management Initiatives, July 2008
Western States Watershed Study Water Data, July 2008
Collaboration Among Federal and State Agencies in Support of Locally-Led Watershed Initiatives – Lessons from a Sample of Case Studies, July 2008
404 Permit Information Pamphlet and Pilot Flowchart, 2008
Western States Watershed Study, Action Plan to Collaborate with multiple tribes on regional water resource topics , July 2008

Western States Watershed Study, Report on Policy, Programs and Authorizations, July 2008
Western States Watershed Study, Climate Change and Reservoir Rule Curves, July 2008
Recommendations from the Western States Watershed Study adopted by the WSWC/WGA and included in their 2008 Report.
Western States Watershed Study, Executive Summary Report to USACE HQ (this report), August 2008
Western States Watershed Study, Executive Summary and Technical Appendices, Report to the WSWC, August 2008

Table 5. List of Technical Reports

B. Corps Project Study Team Leaders

The following table includes those members from the Corps who served as study team leaders.

Executive Oversight	
Mike Fallon, SWD-PD	
Technical Advisory Team	
Joe Dixon, Corps (Retired)	Steve Bredthauer, NWD-RBT
Scott Stoddard, SPK-PD-W	
Headquarters Support Team	
Margaret Johanning, CW-CP	Chuck Moeslein, CW-NWD
David Shepp, CW-CE-R/SAD	
Project Team	
Gene Lilly, SWT-PE-P, Project Manager	Marcia Hackett, SWF-PM-C, Lead Planner
Bill Miller, SPL-PD, Lead Planner	Alicia M. Austin Johnson, SPA-PM-CP, Lead Planner
Steven Ashby, ERD-EP-P, Technical Team Leader	Hal Cardwell, IWR, Technical Team Leader
Lyn Martin, IWR, Technical Team Leader	Rolf Olsen, IWR, Technical Team Leader

Table 4. Corps Study Team Leaders

C. Project Delivery Team Members

The following table includes a comprehensive list of the project delivery team members from the states and federal agencies who participated in the study. Areas highlighted in yellow denote the senior leadership of the WSWC.

PDT Member	Contributing Role	Organization
Gene Lilly	Project Manager	SWT-PE-P
Mike Fallon	Senior Leader	SWD-PD
Duane Smith	WSWC Chairman (Oklahoma). Also served on the Policy and Programs PDT.	
Craig Bell	WSWC Executive Director. Primary Customer POC. Also served on the Federal Resources and Policy and Programs PDT's	
Pam Alambar	Program Analyst	SWT-P
Craig Albertsen	Water Data and Watershed Tools PDT's	BOR

Hal Anderson	Water Data PDT	WSWC,
Steve Ashby	Watershed Tools PDT Technical Lead	ERD-EP-P
Barney Austin	Water Data PDT	WSWC (Texas), ICWP member
Dennis D. Austin	Final Reports, Editor and Consultant	Private Consultant (Utah)
Alicia M. Austin Johnson	Partnership Agreement, Collaborative Planning, Federal Resources, and Final Report PDT's Lead	SPA-PM-C
Walt Baker	Watershed Tools and Federal Resources PDT's	WSWC (Utah)
Cynthia Banks	Asset Management PDT	ERD-EP-R
Jack Barnett	Watershed Tools and Collaborative Planning and Federal Resources PDT's	WSWC (Utah)
Stephen Bernath	Climate Change PDT	WSWC (Washington)
Ann Bleed	Policy and Programs PDT	WSWC (Nebraska)
Dave Brandon	Water Data PDT	NOAA
Steve Bredthauer	Advisory Team and Asset Management PDT	NWD-RBT
Levi Brekke	Climate Change PDT	Reclamation
Bruce Brown	Asset Management PDT	Reclamation
Curtis Brown	Federal Resources PDT	Reclamation
Joan Card	Federal Resources PDT	WSWC (Arizona)
Hal Cardwell	Collaborative Planning PDT Technical Lead	IWR
Tom Carr	Drought PDT	WSWC (Arizona)
Tammy Conforti	Silver Jackets Program	IWR-GR
William Cunningham	Water Data PDT	USGS
Joe Dixon	Advisory Team, Policy and Programs PDT	Corps (ret)
Garland Erbele	Policy and Programs and Asset Management PDT's	WSWC (South Dakota)
Peter Evans	Water Data Peer Review	MP-POD
Pete Fickenscher	Climate Change PDT	NOAA (NWS)
Beth Faber	Climate Change PDT	IWR-HEC-WR
Ann Fissekis	Climate Change PDT	SPK-ED-DW
Roger Gorke	Watershed Tools, Federal Resources, Policy and Programs, and Asset Management PDTs	EPA
Marcia Hackett	Water Data Collection, Drought, and Climate Change PDT Lead	SWF-PM-C
Rob Hartman	Climate Change PDT	NOAA (NWS)

Chuck Hennig	Climate Change PDT	Reclamation
Ted Hillyer	Drought PDT	IWR-GR
Martin Hudson	Advisory Team, Asset Management PDT	NWD-PDD
Margaret Johanning	Corps Headquarters PM, Peer Review	CW-CP
Jeanine Jones	Drought and Climate Change PDT's	WSWC (California)
Ron Kneebone	Federal Resources / Tribal Liaison PDT	SPA-PM-C
Weir Labatt	Policy and Programs PDT	WSWC (Texas)
Harry Lins	Drought PDT	USGS
Sue Lowry	Water Data Collection, Watershed Tools / Collaborative Planning, Federal Resources, and Policy and Programs, PDT's	WSWC (Wyoming), ICWP member
Lynn Martin	Federal Resources PDT Technical Lead	IWR
Clayton Matt	Federal Resources PDT	WSWC (Confederated Salish and Kootenai Tribes)
Ken Maxey	Asset Management PDT	Reclamation
Shaun McGrath	Federal Resources, Asset Management, and Climate Change PDT's	WGA
Bill Miller	Watershed Tools PDT Lead	SPL-PD
Chuck Moeslein	Partnership Agreement PDT Technical Lead	CW-NWD
Bruce Muller	Climate Change PDT	Reclamation
Mike Norris	Water Data Collection PDT Technical Lead, Policy and Programs PDT	USGS
Rolf Olsen	Water Data Collection, Drought, and Climate Change PDT's Technical Lead	IWR
Phil Pasteris	Water Data Collection PDT	NRCS
Ken Pathak	Watershed Tools PDT	ERDC
Chandler Peter	Collaborative Planning PDT, Omaha District Lead Regulator	NWO-OD-RE
Meredith Peterson	Advisory Team	SPD-DX
Roger Pulwarty	Drought PDT	NOAA
Jan Rasgus	HQ Peer Review	CW-PB
Cheryl Redding	Office Manager	WSWC
Kerry Redican	Federal Resources PDT	IWR
Michelle Schmidt	Water Data Collection PDT	NOAA-NWS
David Shepp	Partnership Agreement PDT	CW-CE-R/SAD
Leigh Skaggs	Federal Resources PDT	IWR

Ken Slattery	Watershed Tools and Policy and Programs PDT's	WSWC (Washington)
Mark Spears	Water Data Collection PDT	USGS
Ward Staubitz	Federal Resources, Watershed Tools/Collaborative Planning PDT's. Water Data Collection PDT Technical Lead,	USGS
Tom Stiles	Federal Resources and Asset Management PDT's	WSWC (Kansas)
Scott Stoddard	Advisory Team	SPK-PD-W
Dennis Strong	Drought PDT	WSWC (Utah)
Burton Suedel	Asset Management PDT	ERD-EP-R
Stu Townsley	Climate Change PDT	SPK-ED-DW
Seshu Vaddey	Climate Change Workshop	NWP-EC-H
Kevin Ward	Asset Management PDT	WSWC (Texas)
Jerry Webb	Water Data Peer Review	CW-CE
Phil Ward	Water Data Collection PDT	WSWC (Oregon)
Bill Werick	Collaborative Planning PDT	IWR Consultant
Kate White	Climate Change Workshop	ERD-RR-N
Tony Willardson	Watershed Management, Policy and Programs, and Asset Management PDT's	Deputy Director, WSWC
Lanora Wright	Advisory Team and Federal Liaison Implementation PDT Lead	SWD-PDS-P

Table 5. Project Delivery Team Members

E. Letters Received from Study Partners