Patterns of Regional Collaboration among Municipal Water and Wastewater Utilities

By

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ABSTRACT

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Patterns of Regional Collaboration among Municipal Water and Wastewater Utilities

Thesis directed by Associate Professor Angela Bielefeldt

The goal of this research was to provide a comprehensive examination of regional water and wastewater utility collaboration. Water and wastewater utilities continually face new challenges that require unique efforts and solutions to address. Regional collaboration may effectively address these challenges, including new and ongoing issues such as water quality and supply, economic factors, customer service and communication, and disaster response/security. Regional collaboration among water and/or wastewater utilities was evaluated using a national survey of collaborations (conducted in collaboration with the Strategic Management Practices Committee of the American Water Works Association) and a survey of utilities in Colorado. The results from these surveys illustrated several examples of collaboration areas, governance structures, financial management types, benefits, and lessons learned from 150 different regional collaborations. Regional collaborations appear very common, especially in Colorado, where most the utilities surveyed participated in at least 3 collaboratives. Additionally, these collaborations are much older than initially anticipated, with 30% of the collaboratives from the national survey and 63% of the collaborations from Colorado working together for at least 11 years. The key collaboration areas described were legislative/regulatory issues, operational concerns and efficiencies, water supply concerns, and cost reductions. Surprisingly, no particular trends were found comparing collaboration size, age, governance structure, financial management types, or areas of collaboration. There was a great diversity of ideas evident for lessons learned and benefits from regional collaborations. The most common benefits of regional collaboration were cost reductions, regulatory and policy coordination, information sharing and communication, and shared water resources planning. By examining the critical factors for success, challenges and constraints, and roadblocks and barriers described by the utilities and collaborations, other interested parties can get ideas to guide their own

collaborations. Regional collaborations are unique and diverse; there are no simple models for developing a successful collaboration. These collaborations yield a wide range of benefits, and all utilities are encouraged to explore the potential to address challenges that they are facing by collaborating with others.

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INTRODUCTION

Water and wastewater utilities continually face new challenges that require unique efforts and solutions to address. Many of these challenges include ongoing issues such as water quality and supply, economic factors, customer service and communication, and employee education and training. This project aims to determine how water and wastewater utilities use regional collaborations to help navigate these challenges.

The roots of this study began when the Strategic Management Practices Committee (SMPC) of the American Water Works Association (AWWA) developed the National Inventory of Regional Collaborations Project, which used a detailed interview method to characterize existing regional collaborations among water and wastewater utilities. Due to the time required for the interviews and limited resources of the SMPC, a Request for Proposals was prepared to hire a contractor to complete additional interviews and analyze the resulting data. A team from the University of Colorado Boulder was selected for this task. The team initially met with Jim Ginley to identify the collaboratives of greatest interest to interview. Meetings with representatives from about three collaboratives were set up at the 2011 AWWA ACE Conference in Washington, D.C. Additional interviews were conducted over the phone using the same questions and methods as were employed in Phase 2 by the SMPC members. In total, the CU team added 17 additional collaboratives into the data pool.

The results of the AWWA National Inventory of Regional Collaborations are discussed below. This project raised additional questions and prompted further research into regional collaborations. A subsequent study of Colorado water and wastewater utilities and their involvement in regional collaborations was conducted to expand on the AWWA Inventory and answer some additional questions. Together these studies provide a more comprehensive examination of regional water and wastewater utility collaborations.

The second chapter of this report is a literature review providing a background on utility regional collaborations. The third chapter of this report outlines the research objectives for both the AWWA Inventory and the Colorado

Surveys. Chapter 4 describes the research approach used, detailing the survey processes, data collection and data analysis methods. Chapter 5 summarizes the data analysis and results of both surveys, specifically addressing areas of collaboration, governance structures, financial management, benefits and lessons learned. Specific case studies from each survey are presented as examples of effective collaboration. The report concludes with a conclusion of the results and discusses further work.

CHAPTER 2: LITERATURE REVIEW

This chapter provides a summary review of the literature to determine what is known from previous studies and/or utility collaborations.

INTRODUCTION

Although many examples of regional collaborations can be easily identified using a simple Google-search on the web, published information on the benefits and best practices for collaborative efforts between utilities are rather sparse. The Tropical Rivers and Coastal Knowledge (TRaCK) research hub in Australia is one of the only reports on collaborative efforts that included information on areas for improvement, lessons learned, barriers, and best practices.

This literature review is organized into four sections. The first section, Utility Collaboration Structures, provides an overview of the EPA and the U.S. Department of Interior's involvement in promoting collaborations, the system partnership spectrum and definitions of each level of system partnership. It includes several case studies and an overview of the Security Information Collaborative guide published by the EPA. The concept and application of regionalization for small water and wastewater utilities is also examined.

The second section, Collaboration Areas and Benefits, describes several areas of collaboration for water and wastewater utilities with several examples. The third section, Utility Collaboration Benefits, examines several challenges and benefits identified for regional utility collaborations. The final section, Utility Collaboration Studies provides an overview of three different studies that report on regional collaboration efforts, including the TRaCK study.

UTILITY COLLABORATION STRUCTURES

In May 2006, seven prominent national organizations and agencies entered into a Statement of Intent to "formalize a collaborative effort among the signatory organizations in order to promote effective utility management": the Association of Metropolitan Water Agencies (AMWA), the American Public Works Association

(APWA), the American Water Works Association (AWWA), the National Association of Clean Water Agencies (NACWA), the National Association of Water Companies (NAWC), the United States Environmental Protection Agency (EPA), and the Water Environment Federation (WEF). Ten attributes were identified for effective management of water sector utilities: product quality, customer satisfaction, employee and leadership development, operational optimization, financial viability, operational resiliency, community sustainability, infrastructure stability, stakeholder understanding and support, and water resource adequacy. These ten attributes are common between water utilities and can present challenges that can potentially be overcome by regional collaboration. (U.S. EPA, 2007)

The EPA strongly supports and promotes water and wastewater utility collaboratives. However, so far the EPA has limited their involvement to raising awareness, encouraging collaboration, and documenting case studies and practices rather than providing any formal guidance, with the exception of a publication on security-information collaboratives in 2005.

System Partnership Spectrum

The range of cooperation types from informal to ownership transfer are described in Table 1.

TABLE 1. SYSTEM PARTNERSHIP SPECTRUM (U.S. EPA, 2002) (U.S. EPA, 2009)

Informal Cooperation	Contractual Assistance	Joint Powers Agencies (JPA)	Ownership Transfer
→ → → **Increasing Transfer of Responsibility** → → →			
Coordinate with other systems, but without contractual obligations	Utilities contract with another system or service provider, but contract is under the system's control	Creation of a new entity designed to serve the systems that form it	Takeover by an existing entity or a newly created entity
Examples:			
• Sharing equipment • Sharing bulk supply purchases • Mutual aid arrangements	• O&M • Engineering • Purchasing water	• Sharing system management • Shared operators • Shared source water	• Acquisition and physical interconnection • Acquisition and satellite management • Transfer of privately-owned system to new or existing public entity
Case Studies:			
• Northeast/Merrimack Valley Consortium of Water and Wastewater Facilities (MVC), Massachusetts	• City of Panora Water System, Iowa	• Tripp County Water User District (TCWUD), South Dakota • Logan-Todd Regional Water Commission (LTRWC), Kentucky • Canyon Regional Water Authority (CRWA), Texas	• Ellsworth Estates Water Company/The Connecticut Water Company, Connecticut • Prairieton Water Company/Indiana American Water Company, Indiana • Mountain Regional Water Special Service District, Utah • Possum Kingdom Water Supply Corporation, Texas

A study from the U.S Department of the Interior categorized the options for institutional arrangements within the context of regional brine management systems, as summarized below in Table 2. Nine examples spanning these different options were provided.

TABLE 2. PROS AND CONS OF REGIONAL BRINE MANAGEMENT SYSTEMS (U.S. EPA, 2009)

	Multiple Owners	Joint Powers Authority	Single-Owner multiple contracts	Single Owner special distract
Pros	Each agency-owner pays for its portion Each agency-owner responsible for its portion No single agency responsible	Broader array of financial options Cost sharing Can add members over time Benefit from exercising power of another agency through the JPA	1 owner controls construction, compliance, operation Costs shared via contracts Can include users public, private, etc.	Easy and quick to set up 1 owner controls construction, compliance, operation
Cons	High level of cooperation Detailed agreement No single agency secures financing	Agreement is time and labor intensive Extra admin costs to operate the JPA	May increase cost due to higher interest rate Inequity of cost share could occur	Use requires membership in district Ability to private companies to use could be limited
Example	City Los Angeles/WBMWD	Santa Ana Watershed Project Authority Encina Wastewater Authority	Metro Wastewater Dept. in City San Diego	Metropolitan Water District of Southern California (MWDSC) Calleguas Municipal Water District (MWD).

A JPA is a group of legally distinct entities, each of which has its own governing board and is independent from other member agencies. JPAs are established by entering into an agreement for joint exercise of power, a JPA agreement, establishes operational constraints, the composition of the governing board, funding arrangements, staffing, financial provisions, and duration of the authority (Stava, Jeff, 2006).

A special district is "any agency of the state for the local performance of governmental or proprietary functions within limited boundaries" (Government Code 16271 [d]). A special district has four characteristics (Special District Fact Sheet, 2006):

- It is a form of government
- It is governed by a board
- It provides services and facilities
- It has a defined service area or boundary

Special districts are formed either under a generic principle act or a special act for unique circumstances. Most water agencies that are special districts are singlefunction, enterprise, independent districts. This means that the district has a single function (for instance, providing water services). Such a district is managed like a business in that services are paid for via user fees, and it has an independently elected or appointed Board of Directors (Mizany and Manatt, 2002).

REGIONALIZATION

Several reports and articles review regionalization in water and wastewater utility management. As mentioned previously, the watershed approach to water management directly reflects regional perspectives.

> Regionalization constitutes fundamental *structural* and *institutional* change in the way water and wastewater utility services are provided. Regionalization reflects *structural* change in terms of consolidating water utility ownership, operations, or management within a politically geographic or hydrogeologic area. Regionalization reflects *institutional* change in terms of establishing public policy and resource planning frameworks that encompass regional considerations (Beecher, Higbee, Menzel, & Dooley, 1996).

In general, much of the literature regarding regionalization agrees with the technical and economic benefits, but notes a common frustration with the institutional context of implementation (Beecher, Higbee, Menzel, & Dooley, 1996) (Jones, et al., 1992).

The 1995 *Framework for Watershed Management* report concerns the development of a strategic planning approach to watershed management. The report notes that several states (North Carolina, South Carolina, Washington, Nebraska, and Massachusetts) are implementing statewide frameworks incorporating watershed management principles. The essential elements of the continuous management cycle are listed: strategic monitoring, basin assessment, prioritization and targeting, developing management strategies, management plan and documentation, and implementation. (Clements, Crager, Beach, Butcher, Marcus, & Schueler, 1995)

Researchers used a fictitious community to demonstrate an application of the framework. The role of planning in providing a forum for collaboration among key stakeholders, without a regulatory mandate to participate, is emphasized. Some of the tools for facilitating watershed management identified in the report were: environmental indicators and data integration methods, quantitative risk assessment, water-use attainability analysis, procedures of setting site-specific water quality standards, ecological restoration information, pollution trading guidance, monitoring consortiums, information management and analysis, administrative structures to implement watershed approaches, and watershed zoning. Impediments to statewide watershed management include: legal, institutional, and financial impediments; uncooperative stakeholders; mistrust and cynicism; and transitional issues. Recommendations are made for implementing the watershed framework within constraints. (Clements, Crager, Beach, Butcher, Marcus, & Schueler, 1995)

Regionalization for small water and wastewater systems has the strongest drivers. These systems face increasingly stringent regulations under the Safe Drinking Water and Clean Water Acts (SDWA & CWA) coupled with rising capital and operating costs. In the end, rural residents pay, on average, 3 to 4 times more than their urban counterparts for these services (U.S. EPA, 1999). Regionalization, or restructuring/combining some of these small water and wastewater systems, creates economies of scale and helps maintain financial viability for these systems. (Martin, 2010)

San Diego County is one example of an area where regionalization is being considered and could be highly beneficial for the region. Despite previous mergers there are currently 24 separate agencies in San Diego County, where entire groves are dead as farmers walk away. As operating losses increase due to plummeting sales and high prices in many regions, more water districts are considering collaboration among utilities to save on administration and operating costs. Four San Diego water districts in North County (Fallbrook, Valley Center, Rainbow and Yuima) are considering functional consolidation, where one agency or a joint powers authority (JPA) performs tasks for all four water districts. (William Osborne, 2011)

One of the barriers to regionalization of small systems includes a lack of credible evidence or statistics on the degree of regionalization, despite the clear benefits. Other barriers include fears regarding the loss of autonomy, lack of knowledge, absence of a coordinating entity, lack of state or regional leadership, lack of support, lack of communication, large initial capital costs, geographic distances, and deteriorated condition or small size of some systems that are not easily overcome. These barriers are discussed in detail in the Rural Community Assistance Partnership (RCAP) report (Martin, 2010) along with recommendations and potential regional solutions.

Utility Collaboration Areas

Several key areas of collaboration were identified through this literature review including water quality and supply, cost reductions, emergency preparedness and security, and workforce concerns.

Water Quality & Supply

As early as 1993, an article titled “Comprehensive Watershed Management: A View from the EPA” reviewed the EPA’s official position on the Clean Water Act (CWA) reauthorization and promotes the establishment of partnerships and collaborations for watershed-based management of water resources. A fragmented approach to water quality can no longer be afforded. The EPA’s conception of water management consists of: (1) recognizing the interconnectedness of ecosystem resources, (2) identifying priorities and tailoring solutions, (3) building partnerships, (4) integrating programs, and (5) securing local commitment to implementation. Comprehensive management involves every level of government (federal, state, and local), as well as universities (including

collaborationists who recognize the need to build interdisciplinary relationships). Also, a "nested" approach recognizes a progression from smaller, localized watersheds to the larger, encompassing water basin; planning and management for the smaller entities must be incorporated within planning and management for the larger entity. New umbrella institutions (such as interstate regional agreements) may be needed. Watershed teams can be used for developing a vision, building understanding, and facilitating implementation. (Wayland, 1993)

A 2009 report published by NACEPT, advising and making recommendations to the EPA, addresses concerns about the long-term sustainability of water sector utilities and examines regional collaborations and partnerships as a potential solution. This report gives a brief background of regional collaborations and their drivers, identifying some of the key questions regarding regional collaborations: What is meant by regional collaborations and partnerships? Are there indicators that would help EPA identify the types of utilities that would benefit from such collaborations? What do successful regional collaborations have in common? What are the barriers to collaboration? What can EPA do to promote, encourage, and support water integrated resource planning, watershed management, regional collaboration, and a sustainable water sector?

The report tasks the EPA to encourage the collaborative process and asks the EPA to lead by example by applying the watershed approach across EPA water programs:

> To meet the growing challenges of sustainable water management, EPA needs to think beyond a single statute's regulatory requirements to solve problems. Today, watersheds are the more appropriate unit and scale of management for an integrated approach to managing the nation's water resources. Applying the watershed approach across EPA water programs would better inform the effective application of regulations and resources to solve the most pressing problems. By recalibrating EPA's agenda internally, a strong "lead by example" message is sent, lending credibility to EPA efforts to support sustainable water resources management and innovative approaches.
>
> In sum, while EPA recognizes regional collaboration as an effective tool for improving the long-term service of water sector utilities, identifying the specific function that EPA could play in promoting this approach is more challenging. The answer is not straightforward because many of the activities needed to create regional cooperation and partnerships lie outside the traditional roles of EPA. (National Advisory Council for Environmental Policy and Technology, 2009)

Many of NACEPT's recommendations to the EPA for providing better technical guidance, education and outreach on regional collaboration are akin to objectives for this AWWA survey project. These actions include: reviewing the existing body of literature and programs; updating/consolidating/streamlining the information; conducting

research and gathering new information; partnering with water sector professional organizations to create new, utility-focused intiatives in education, communication and outreach; and creating an accessible, centralized Web-based repository of tools and resources. (National Advisory Council for Environmental Policy and Technology, 2009)

The Cape Cod Water Protection Collaborative exists to offer a coordinated approach to enhance the water and wastewater management efforts of towns, the Regional Government and the broader community. The Collaborative seeks to protect Cape Cod's shared water resources and to provide access to cost effective and environmentally sound wastewater infrastructure. The Collaborative seeks funding support for the Cape communities, establishes priorities, directs strategy, builds support for action, and fosters regionalism. The governance structure includes a 17 member Governing Board, 6 member Steering Committee, Executive Director and staff provided on a contract basis by other County departments. The 2009 top priorities are: (1) Pursue federal and state funds to support Cape Cod community water and wastewater initiatives, (2) increase public awareness of nitrogen's impact on Cape waterways, (3) begin development of regional wastewater management plan, (4) administer shared watershed grants, (5) develop and maintain a detailed database outlining status of water and wastewater management efforts in each of the 15 Cape communities, and (6) encourage regionalism. (Cape Cod Water Protection Collaborative, 2011)

The Saving Water Partnership includes 18 utilities in the regional Seattle Area that fund water conservation programs through the 1% Water Conservation Initiative. The goal of the initiative is to reduce personal and business water consumption by 1% every year for ten years in order to save approximately 14.5 million gallons per day (MGD), matching the estimated needs of the growth level within the county over the next ten years. The 2009 report highlights several of the programs accomplishments and results. In its 9th year, despite significant population growth, the regional water system uses the same amount of water that it did in the early 1960s, with 9.0 MGD total savings since the start of the program in 2000. The 2010 report hasn't been released. This collaboration hosted several different groups and programs to reach out to personal and business consumers to promote conservation measures and education as well as improve customer service. Other policy objectives include resource stewardship, endangered species protection, cost-effective extension of existing supplies, and

reliability. (Seattle Water Supply System Regional 1% Water Conservation Program, August 2010) (Saving Water Partnership, 2005).

The WateReuse Association is a nonprofit organization whose mission is "to advance the beneficial and efficient uses of high-quality, locally produced, sustainable water sources for the benefit of society and the environment through advocacy, education and outreach, research, and membership. There is an Australian Division and sections in Arizona, California, Colorado, Florida, Nevada, and Texas. Members of WateReuse Colorado includes Aurora Water, Colorado Department of Public Health & Environment, Colorado School of Mines, Colorado Springs Utilities, Denver Water, City of Westminster, Carollo Engineers, CDM, Kennedy/Jenks Consultants, Plum Creek Wastewater Authority, Richard P. Arber Associates, Stratus Consulting, Tetra Tech, and Trussell Technologies. The by-laws specify membership, eligibility to vote, finances, and governance. Section finances come primarily from membership dues and event fees. The section is governed by a board of directors, officers of the board, and a national representative that services on the WateReuse Association's Board of Directors. (WateReuse Association, 2011)

The Western Urban Water Coalition is national association of municipal water utilities created in 1992 with 13 members, including Denver Water, that aim to provide a new and distinct perspective on modern West water resources management. The collaboration is governed by a board of directors and has committees addressing issues including the Clean Water/Safe Drinking Water Acts, climate change, Colorado River, Endangered Species Act, and water conservation, reuse & recycling. (Western Urban Water Coalition, 2011)

Cost Reductions

NREL has several ongoing collaborative efforts with government agencies, non-governmental organizations (NGO) and local water/wastewater utilities. Through collaborative efforts with government agencies, the Energy Management Initiative for Public Wastewater and Drinking Water Utilities seeks to reduce municipalities' energy costs at water and wastewater treatment plants by at least 20%, minimize the impact of water and wastewater treatment utilities on the environment, and share experiences, benefits, and lessons learned with other utilities. NGO collaboration currently involves exploring water resource management as a tool to reduce energy

consumption and CO_2 emissions. Local Colorado water and wastewater utilities, partnered with NREL, provide hands-on access to facilities' technology, data, and personnel, for energy efficiency and renewable energy expertise. The major aversion in these collaborations was high capital cost investments. Common collaboration deficiencies included energy monitoring devices, detailed knowledge of energy usage for each process, technical/analysis expertise, personnel time to analyze information, SCADA system differences, and varying needs for large and small utilities. (Macknick, 2010)The purpose of the Sonoma-Marin Saving Water Partnership is to establish the financial obligation for eight local water utilities, Marin Municipal Water District and Sonoma County Water Agency, identify and recommend implementation of water conservation projects and to maximize the cost-effective projects for the Partnership. The Partners are committed to remain as members in good standing of the California Urban Water Conservation Council (CUWCC) and implement the Best Management Practices (BMPs) for water conservation. The Partners will implement or use best efforts to secure the implementation of any water conservation requirements. (Sonoma Marin Saving Water Partnership, 2011)

There are eight communities participating in the Missouri Water Utilities Partnership (MOWUP) to provide a coordinated approach for advanced municipal energy savings and greenhouse gas reduction. The purposes of the collaboration include helping municipalities reduce utility costs in water and wastewater treatment plants, improving reliability and performance of those community assets, minimizing the impact of water treatment utilities on the environment, and developing individual Energy Management Plans for each community's water treatment utilities through a pilot program. (Missouri Water Utilities Partnership, 2010)

The Sacramento Municipal Utility District (SMUD) and the Sacramento Regional County Sanitation District partnered to implement the Biogas Enhancement Pilot Test Project. This project evaluated the feasibility of using waste materials to generate additional biogas and determine ideal performance parameters. The study detected incremental production of biogas and no fatal flaws that would impact implementation or operation of a full-scale program. Some performance parameters fell short, requiring further analysis and plant design modifications before constructing a permanent facility. SMUD/SRCSD received $1.5 million in grant funding to construct the facility from the U.S. Department of Energy and the California Energy Commission. (Ave, 2010)

Emergency Preparedness & Security

In 2005, the U.S. EPA published a guide for water utilities to create their own security-information collaborative using three case studies: Bay Area Security Information Collaborative, Milwaukee Inter-Agency Clean Water Advisory Council, and Newport News Waterworks Collaborative (U.S. EPA, 2005). As security concerns have become prominent since the terrorist acts on September 11, 2001, many water and wastewater utilities have had to improve security to respond to potential threats. This guide provides information on a variety of collaboration governance structures, benefits, operation and maintenance, lessons learned from case studies as well as some sample resource documents to help utilities establish their own collaborative based on their specific needs.

Though not intended as a guidance document, the Seattle-King County, Washing Community Case Study provides examples of security and preparedness practices at water utilities in the Seattle-King County area in order to share these practices with other water sector utilities. One of the objectives of the project team was to promote collaboration by improving understanding of the relationship between implementing security program features and how various community agencies are linked through these practices. The case study showed that one of the main lessons learned was that collaborative partnerships with other interdependent sectors is essential for enhancing water sector security and preparedness. The EPA's support going forward is "to raise awareness and encourage adoption of effective practices that individual communities and utilities may determine appropriate. EPA's involvement with documenting practices is not a promulgation of guidance or requirements (U.S. EPA, 2007)

Workforce Concerns

BAYWORK is a joint venture between water/wastewater utilities in six Bay Area counties. With an executive committee including representatives from EBMUD, SFPUC, Santa Clara Valley Water District, and more, this regional collaboration promotes water careers as both professionally fulfilling and aligned to the greatest public health and environmental cause of our day. Its goals also address one of the water community's top concerns in

the coming decade—the expected retirement of 30% of the water workforce and the need to recruit new talent to the field. Major milestones thus far include a study in collaboration with the Bay Region Centers of Excellence regarding future labor needs, the hosting of a summit meeting with community colleges and workforce development boards to collaborate on shared program development, the launch of a job opportunity map, collaboration with www.h2opportunity.net to publish Bay Area related opportunities, the pilot development of a video demonstrating a standard operating procedure for use across utilities, and more. The group has plans to launch a website in the near future and publish a charter outlining the origin and objectives of BAYWORK. (San Francisco Public Utilities Commission , 2010)

Utility Collaboration Benefits and Challenges

In 2002 and 2009, reports by the US EPA examined system partnerships solutions as a tool for building water system capacity, especially for small systems. Small systems face several common technical, financial, and managerial challenges and small partnership solutions could potentially lead to improved outcomes. Several case studies spanned the spectrum of types of system partnerships and summarized the benefits of the partnerships (

Table 3).

TABLE 3. SMALL SYSTEM CHALLENGES AND POTENTIAL OUTCOMES (U.S. EPA, 2002) (U.S. EPA, 2009)

Small System Challenges	Potential Outcomes
Technical	
• Inadequate & deteriorated infrastructure • Limited/poor source quality/quantity • Lack of operations & maintenance expertise/certified operator	• Shared, new, or upgraded infrastructure • Locate higher quality/quantity source water • Access to a certified operator and additional expertise • Better treatment technologies available
Financial	
• Diseconomies of scale (few households = high costs) • History of low rates = resistance to full-cost pricing • Limited knowledge of financing options • Small systems are often in economically disadvantaged areas	• Reduced costs = safe and affordable water at full pricing • Greater economies of scale achieved through shared services • Better access to funds
Managerial	
• "No time" or limited part time management attention • Lack of expertise in long-term water system planning/operations • Lack of focus – providing water is not the system's primary purpose	• Expertise in water system planning/operations • Accelerated path to obtaining the managerial skills and structure required to adequately oversee the water system

Because 86% of America's 54,000 community water systems are small systems serving less than 3,300 people and 86% of these small systems are within 5 miles of another system (U.S. EPA, 2002), there are numerous opportunities for beneficial system partnerships.

An AwwaRF study in 2006 called for a new paradigm of "benefits and issues" rather than "pros and cons" to examine the potential for achieving economic benefits from enhanced regional collaboration among the several publically owned water and wastewater utilities in Lehigh Valley, Pennsylvania (Raucher, et al., 2006). A follow-up study in 2008 used this paradigm to show that there was a window of opportunity during which these utilities could save tens of millions of dollars each year (or potentially as much as $260 per year per household) through enhanced regional collaboration through improved planning, financial management, risk reduction, facilities

planning, infrastructure management and workforce management, with many of these opportunities lost if action wasn't taken soon (Cromwell & Rubin, 2008).

The Green Bay Metropolitan Sewerage District discusses regional collaboration in their 2009 Strategic Plan, suggesting that the future landscape for environmental service delivery in northeast Wisconsin has more unique opportunities than ever before for collaboration among regional stakeholders. Challenges including prospective regulatory requirements, limited physical resources and technical expertise, rising costs and changing workforce demographics are looked at as an opportunity to form collaborative partnerships rather than roadblocks. (Green Bay Metropolitan Sewerage District, 2009)

Technical, financial and managerial benefits from four of the case studies in the EPA 2009 report are summarized in

Table 4.

TABLE 4. CASE STUDY SUMMARIES AND BENEFITS (U.S. EPA, 2009)

Case Study	Snapshot	Timeline	Benefits		
			Technical	Financial	Managerial
Northeast/Merrimack Valley Consortium of Water and Wastewater Facilities (MVC) (Informal Cooperation)	35 municipal systems negotiate for and purchase laboratory supplies and treatment chemicals together.	Formed in mid-1980s	shared service maintains secure supply and high-quality	economy of scale reduces cost and gives more options	Information sharing of experiences, challenges, best practices
Panora, IA (Contractual Assistance)	Panora has partnered with neighboring systems to purchase water and receive training.	2002	shared infrastructure interconnect water line	reduced cost by outsourcing monitoring	remote monitoring by DMWW efficient; expertise building
TCWUD (Joint Powers Agency)	The systems served by TCWUD continue to operate and maintain their own distribution systems without TCWUD's involvement.	2002	higher quantity/quality water, shared infrastructure	economy of scale cuts operating costs, labor costs	share expertise to solve common problems
LTRWC (Joint Powers Agency)	12 autonomous water systems maintain ownership, and operating and maintenance responsibility for their distribution infrastructure.	1995	higher quantity/quality water, shared infrastructure, better tmt technologies	economy of scale for purchasing supplies; reduce longterm costs	efficiency of resources, share tmt to focus on distribution, retain local control

UTILITY COLLABORATION STUDIES

Very few studies examined regional collaboration activity and assessed their effectiveness and other factors. Drivers, governance structure, activities, funding and benefits for regional collaborations are discussed below for

the Upper Hondo Collaborative Water Group, Wisconsin Municipal Stormwater Collaboratives, and the Tropical Rivers and Coastal Knowledge (TRACK) Collaborative Water Planning Project.

Upper Hondo Collaborative Water Group

The Upper Hondo Collaborative Water Group started on October 25, 2004 to "develop an economical and feasible way to meet the water demand of the Upper Hondo area with a sustainable water supply." The group developed a basic agreement and a scope of work for a planning consultant to develop alternatives for water supply. Some of their issues and concerns include depleting and limited water supply coupled with future growth and impact of subdivision approvals on water supply, concerns about water rights, increased water demand, ability to create consistent water conservation measures across area, ability to educate public on gravity of challenge and need for conservation and impact of septic systems in the area on groundwater.

The collaboration came together due to a recognized need for region-wide collaboration and planning in a sustainable way and because any potential solution(s) would be expensive, all participation was voluntary but an assessment of non-participants showed mainly small water systems with limited resources. Some of the major obstacles to collaboration included distrust of participants based on past experiences, wide variations in water supply available to providers, and concurrent state-wide water planning.

At the time of the report some cities and utilities have signed the Letter of Commitment, but many of the smaller systems required more time to review the agreement before signing due to seasonal population and Boards of Directors meetings timing. The purpose of the agreement is to work together to collect information needed to understand the water resources of the area and to acquire a planning grant to develop options to provide the area with sustainable water supply. After signing the agreement, the group wants to hold a workshop on funding sources and strategies with representatives from various funding agencies and to pursue funding opportunities for the Scope of Work.

Long term activities planned include creating consistent and uniform conservation measures across the area, educating the public on the gravity of the water resource situation and need for further conservation, developing subdivision regulations that promote sustainable water use, and achieving a sustainable water supply for the area.

Funding for both planning studies and coordinating the group for short and long terms appears to be the major obstacle for the collaboration. The collaboration 'best practices' noted included positive previous experience of participants in collaboration and that "participants believe that good planning is benefited by responsible leadership, by effective facilitation of meetings, and by committed staff people who follow through on decisions made by the group." The Method of Management (Appendix A) defines the Management Committee, voting rules, term appointments, and Fiscal Agent (might add under governance subsection).(Also might want to see about interviewing this collaborative for updated information). (Upper Hondo Collaborative Water Group, 2005)

Wisconsin Municipal Storm Water Collaboratives

This report discusses several storm water collaboratives that have formed in Wisconsin to make a more efficient and effective permit complying process. These collaboratives include the Northeast Wisconsin Storm Water Consortium (NEWSC), Madison Area Municipal Storm Water Partnership (MAMSWaP), Regional Storm Water Protection Team (RSPT; Duluth-Superior), Chippewa Valley Storm Water Management Forum, Clean Ways for Waterways (Washington County), La Crosse Urban Municipal Storm Water Group, Waukesha County Storm Water Information and Education Partnership, and Marathon County Metropolitan Planning Commission Storm Water Management Sub-Committee. All of the partnerships have formal agreements except for NEWSC. Six of the eight groups use annual contributions to a fiscal agent to pool funds for staff or educational program support. The remaining two programs manage funding on a project-by-project basis with dollar contributions and in-kind services. Some of these collaborations sometimes include non-municipal, university, non-profit organization, and/or business members. This report notes that "there is no one generic 'model' of a collaborative group that could be put forward for others that may want to initiate their own partnership," indicating that each unique situation driving the collaborative formation also leads to unique arrangements. (Axness, 2007)

Tropical Rivers and Coastal Knowledge (TRaCK) (Australia)

The TRaCK research hub has published several reports and guides for collaborative water planning in Australia's tropical north region. This Collaborative Water Planning Project is the one of the only documents reviewed that has several similarities to the AWWA survey project's approach, by developing a guidance framework for utilities

interested in regional collaboration efforts and compiling information on drivers that foster collaboration, the functional areas that utilities collaborate on, and the benefits from these collaborations. Many of the insights and approaches to this study can be applied to this project.

The Collaborative Water Planning Project seeks to improve water planning efforts at several levels by developing a tool-kit of good practices for collaboration, setting monitoring and evaluation guidelines to assess their effectiveness, provide case studies for good collaboration, and help strengthen long-term relationships.

> Water planning has undergone a series of phases over time during which different paradigms have been evident. Water planners have been, and continue to be, variously concerned with engineering efficiency, economic development, environmental sustainability and community and industry collaboration. The agencies within which they work also exist within a political environment, with staff working both as agents of the government of the day, as well as servants of the public.
>
> Further complexity, confusion and contestation arise from the interplay of potentially competing paradigms within the water sector, including market-based decision making, engineering solutions and the demand for political action to halt the decline of freshwater ecological systems. Developing a toolkit of good practices in water planning may involve making tools that allow water planners to reflect on and, where necessary, adapt the structure and culture of their agencies in response to the internal barriers and enablers to collaborative water planning that they identify, as much as it is about seeking tools to build better ways to work with others outside their agency. Analysis of the prospective case studies will further understanding of this theme, particularly in terms of implications for water planning in northern Australia.
>
> There also appears to be a lack of a systematic, widely applied monitoring and evaluation framework for collaboration in Australian water planning. The discourse of collaboration (including citizen participation) has become increasingly evident in water planning legislation, policy, and practice for over two decades. However, a systematic framework for the evaluation of the outcomes and impact of collaboration in water planning appears lacking – both in terms of monitoring and evaluating the quality of the collaborative process, and in terms how it may have influenced on-ground water management outcomes. The lack of rigour in applying the term often results in water planners, and their government agency supervisors operating in an environment where terms such as 'involve', 'consult', 'collaborate' and 'partner' retain a cultivated ambiguity. Some have claimed that the outcomes expected of deliberative forms of collaboration are naïve and unrealistic underscoring limitations to current political and social theories of collaboration, deliberation and social learning. The dilemmas of when to collaborate, with whom, for what purpose, how frequently and by what methods, and how to report back on the usefulness of these collaborative endeavours arise. Empirically tractable methods for assessing collaborative outcomes are currently under-developed, particularly those suited to deliberative processes. Reporting on such matters logically involves comparing collaborative outcomes to those achieved using other approaches, meaning that the processes and outcomes achieved using other non-collaborative water planning paradigms would also be best evaluated using a similar framework. (Tan, Jackson, Oliver, Mackenzie, Proctor, & Ayre, 2008)

Volume 1 of *Collaborative Water Planning: Context and Practice Literature Review* (Tan, Jackson, Oliver, Mackenzie, Proctor, & Ayre, 2008), also provides an overview of the region's water planning processes and implementation. The report points out the need for transparency in collaboration processes:

> It is precisely for the purposes of reconciling conflict between stakeholders that the water planning process is required to be transparent. The whole planning process and management system is required to provide a much greater capacity to make trade-offs between competing uses in ways that will gain and maintain community support. (Tan, Jackson, Oliver, Mackenzie, Proctor, & Ayre, 2008)

A follow-up legal and policy report by TRaCK in 2009 (Tropical Rivers and Coastal Knowledge (TRaCK), 2009) makes a total of 17 proposals in relation to eight major areas for improvement in collaborative processes in water planning. The same 2009 report also provided several lessons from case studies:

- Respondents indicated they wanted a greater level of transparency in the relationship between their contributions and the planning outcomes
- Seeking feedback from the community is not the same as collaboration
- Clarity around the process, role and rationale of participation is a requirement for effective collaboration
- Participant commitment to the process depends on the extent of input into actual decision-making
- Better methods are needed to make trade-offs in a collaborative way
- There is still an absence of adequate Aboriginal participation and representation
- Integrating knowledge is complex, particularly in making sense of local, cultural and scientific forms of information
- Different techniques of community engagement will yield different forms of input into the planning process
- Government agencies, operating in north Australia at least, are not yet fully convinced of the benefits of properly collaborative processes, as distinct from consultative processes.

Some of the barriers to collaboration found in TRaCK's research include:

- Achieving greater levels of community confidence in the adequacy and accuracy of the technical information used in planning

- Resolving or managing the presence of residual and unresolved tensions in the community
- Finding more appropriate forums for meaningful indigenous participation
- Finding better ways to communicate science
- Reducing the perception that outcomes are pre-determined through improving transparency of decision-making
- Designing ways to increase administrative flexibility in the planning process
- Resolving the disjunct between agency planning requirements and community expectations and needs
- Reducing the high demands on regional water planners
- Building capacity and social learning to address the highly varied capacity and constraints among panel members
- Finding ways to provide more opportunities for deliberation & negotiation among panel members

Some key findings that assisted collaboration were also reported:

- Clarity of process and terms of reference
- High motivation and commitment from community leaders
- High sense of identity and place amongst participants
- Multi-agency representation
- Shared vision for the region amongst the majority of panel members
- Regional staff commitment and support
- Opportunities for review of technical information
- Active pursuit of broad community representation by agencies
- Community support for planning and water reform

(Tropical Rivers and Coastal Knowledge (TRaCK), 2009)

CHAPTER 3: RESEARCH OBJECTIVES

This chapter outlines the research objectives for this thesis answered via both the AWWA Inventory and the Colorado Survey.

The goal of the AWWA National Inventory of Regional Collaborations was to characterize existing regional collaborations among water and wastewater utilities in order to provide helpful information and potentially an overall guidance framework for interested utilities. The information compiled included drivers that fostered collaboration, the functional areas that utilities collaborate on, types of governance structures, and the benefits and lessons learned from these collaborations.

The Colorado Survey of Water and Wastewater Utilities examined regional collaborations from the perspective of the utility. Rather than surveying specific collaborations, this survey was geared to municipal water and wastewater utilities in Colorado. The information compiled was similar to the AWWA project including key areas of collaboration, types of governance structure and financial management, and the benefits and lessons learned from these collaborations.

The specific research objectives/questions, with the survey method indicated in parenthesis (either National, Colorado, or Both), include:

1. How common is municipal water or wastewater utility involvement in regional collaborations? (Colorado)
    a. Do the majority of water and wastewater utilities participate in at least 1 collaboration? (Colorado)
    b. Is collaboration equally common in the drinking water and wastewater sectors? (Colorado)
2. How long have utilities been involved in regional collaborations? (Both)
3. What are typical geographic constraints of regional collaborations? (Both)
    a. Can collaborations cross geo-political boundaries (i.e. state lines, county lines)? (Both)

4. What size of utility typically participates in regional collaborations? (Both)

5. Clarify how utilities become involved in these collaborations (Both)

    a. How do collaborations form? (National)

    b. Do collaborations last and evolve? (National)

6. Highlight effective areas for regional collaboration (Both)

    a. What are the most common topics for collaboration? (Both)

    b. Do most collaboratives function on a tight and limited range of activities, or a broader range of activities? (Both)

7. Define the types of governance structures for regional collaborations (Both)

    a. Are some areas of collaboration better suited to informal governance vs. others better suited to more formal arrangements? (Both)

8. Define management structures for most regional collaborations. (Both)

    a. What financial management structures are common for regional collaborations? (Both)

    b. Do these vary by collaboration goal (i.e. emergency response vs. regulatory issues) (Both)

9. Identify benefits for utilities interested in regional collaboration efforts. (Both)

10. Establish if there are any universal good practices for regional collaborations (Both)

    a. Identify critical factors that led to the success of the collaborative (Both)

    b. Identify key challenges / constraints faced by the collaborative (Both)

    c. Identify any significant roadblocks or barrier faced by the collaborative (Both)

11. Determine areas of missed opportunities for regional collaborations (Colorado)

CHAPTER 4: RESEARCH METHODS

This section describes the research methods first for the AWWA National Inventory of Regional Collaborations and then the Colorado Survey of Water and Wastewater Utilities.

AWWA NATIONAL INVENTORY OF REGIONAL COLLABORATIONS

AWWA SMPC Phases

The data collected to support this research was conducted in two primary phases, followed by analysis. Phase 1 and the first part of the Phase 2 Inventory were completed by the AWWA SMPC before any involvement with the University of Colorado Boulder. In 2009, a Phase 1 inquiry was emailed to all Association of Metropolitan Water Agencies (AMWA) members in order to compile a preliminary list of possible collaboratives to interview. This Phase 1 interest inquiry identified nearly 75 examples of collaborative efforts.

After the Phase 1 inquiry was completed, the SMPC subcommittee developed a detailed survey to gather information on multiple current utility issues and serve as a basis for building an inventory of utility collaborations. The goal of the study was to determine successful collaboration practices, and disseminate this information to the utility community. The Phase 2 inventory targeted information in six categories: general information (i.e. mission, drivers, objectives), governance, collaborative services/activities/initiatives, financial management, benefits, and lessons learned. The utilities identified with the Phase 1 inquiry were narrowed down to 54 desirable participants for this Phase 2 detailed inventory.

The methods for the Phase 2 inventory were developed by the SMPC. The Phase 2 detailed study was initially conducted by SMPC members in 2009 and 28 interviews were completed. The interview methods varied due to the variety of people interviewing the utilities over a period of 2 years, but generally the questions were emailed prior to the scheduled interview and sometimes the responses were filled out by the utility and sent back to the interviewer ahead of time. The questions sent on the form were all in the form of open responses boxes. The interviews were conducted over the phone and typically lasted 30 minutes. During the verbal discussion, the

interviewer from the SMPC filled in any missing information. The final version of the completed interview form was emailed back to the interviewee.

PHASE 2 ADDITIONAL INTERVIEWS WITH LITERATURE SEARCH BY THE UNIVERSITY OF COLORADO (CU)

Due to the time required for the interviews and limited resources of the SMPC, a Request for Proposals was prepared to hire a contractor to complete additional interviews and analyze the resulting data. A team from the University of Colorado Boulder was selected for this task. The team initially met with Jim Ginley to identify the collaboratives of greatest interest to interview. Meetings with representatives from about three collaboratives were set up at the 2011 AWWA ACE Conference in Washington, D.C. Additional interviews were conducted over the phone using the same interview questions and methods as were employed in Phase 2 by the SMPC members. In total, the CU team added 17 additional collaboratives into the data pool.

A summary of the 45 interviews conducted is provided below in Table 5, with the collaboration, state, contact name, and interviewer(s) provided. Most of interviews were of member entities within the collaborative. These are listed in the second column if the interview wasn't directly from a representative of the collaborative.

TABLE 5. SUMMARY OF INTERVIEWS

Collaborative (URL, if available)	Interviewed Entity (if different)	State	Interviewer(s)
Anderson Regional Joint Water System (http://www.arjwater.com/)		SC	SMPC
Apalachicola-Chattahoochee-Flint (ACF) Stakeholders (http://acfstakeholders.org/)	Cobb County-Marietta Water Authority	GA	CU
Arizona Customer Service Professionals	Town of Gilbert	AZ	SMPC
Bay Area Clean Water Agencies (BACWA) (http://bacwa.org/)		CA	CU
Bay Area Security Information Collaborative (BASIC)		CA	CU
Cascade Water Alliance (http://cascadewater.org/)		WA	SMPC
Catawba-Wateree Water Management Group (WMG) (http://www.catawbawatereewmg.org/)	Charlotte Mecklenburg Utilities	NC	SMPC
Central Iowa Regional Drinking Water Commission (http://www.dmww.com/about-us/cirdwc/)	Des Moines Water Works	IA	SMPC
CHIWAWA (Consortium for High Technology Investigation on Water and Wastewater)	El Paso Water Utilities	TX	SMPC
City of Pueblo Flow Program	Board of Water Works of Pueblo	CO	SMPC
Colorado Municipal Forum on Trenchless Technology	Trenchless Technology Center (Louisiana Tech University) (http://www.ttc.latech.edu/)	LA	SMPC
Directors of Utilities Committee	Hampton Roads Planning District Commission	VA	SMPC
East Valley Water Forum (http://www.evwf.org/)	City of Mesa	AZ	SMPC
Eastern Meter Management Association (http://www.easternmeter.org/)	Washington Suburban Sanitary Commission	DC	SMPC
Gila River Indian Community Water Rights Settlement Act of 2005	City of Mesa	AZ	SMPC
Hickory Log Creek Reservoir Project (http://www.canton-georgia.com/reservoir.php)	Cobb County-Marietta Water Authority	GA	CU
Joint Water Commission (http://www.jwcwater.org/)	City of Hillsboro	OR	SMPC
Jordan Lake Partnership (http://www.jordanlakepartnership.org/)	City of Durham Dept of Water Mgmt	NC	SMPC
Lake Allatoona/Upper Etowah River Comprehensive Watershed Study	Cobb County-Marietta Water Authority	GA	CU

Collaborative (URL, if available)	Interviewed Entity (if different)	State	Interviewer(s)
(http://www.la-uewatershed.com/)			
Lake Erie Water Quality Collaborative	Cleveland Division of Water	OH	SMPC
Metropolitan North Georgia Water Planning District (http://www.northgeorgiawater.com/)	Cobb County-Marietta Water Authority	GA	CU
Metropolitan Washington Council of Governments (COG) (http://www.mwcog.org/)	Prince William County Service Authority (PWCSA)	VA	CU
Mid-Arkansas Water Alliance (http://www.carkw.com/regionalism/regionalism.asp)	Central Arkansas Water	AK	SMPC
Multi-Agency Benchmarking Program	Los Angeles Department of Water & Power (LADWP)	CA	CU
Peace River Manasota Regional Water Supply Authority (http://www.regionalwater.org/)		FL	SMPC
Portland Regional Water Providers Consortium (http://conserveh2o.org/)		OR	SMPC
Potomac River Basin Drinking Water Source Protection Partnership (http://www.potomacdwspp.org/)	Fairfax Water	DC	CU
PWCSA several operational collaborative efforts	Prince William County Service Authority (PWCSA)	VA	CU
Regional Training Program	Prince William County Service Authority (PWCSA)	VA	CU
Regional Water Supply Plan	Prince William County Service Authority (PWCSA)	VA	CU
San Diego County Regional Procurement Committee	San Diego County Water Authority	CA	SMPC
San Diego Integrated Regional Water Management Program (http://www.rmcwater.com/clients/sdirwmp/home.html)		CA	SMPC
Shelby-Frankfort Water Management Group	Louisville Water Company	KY	SMPC
Southern Maine Regional Water Council (http://www.smrwc.org/)	Portland Water District	ME	SMPC
Spartanburg County Water Managers Association	San Juan Water District	CA	SMPC
Steering Committee - Wastewater	Detroit Water and Sewerage Department (DWSD)	MI	CU
STOPR Group	Toho Water Authority	FL	SMPC
Sub-Regional Operating Group (SROG) (http://phoenix.gov/PCD/srog.html)	City of Mesa	AZ	SMPC
Tualatin Basin Water Supply Partnership (http://www.tualatinbasinwatersupply.org/)		OR	SMPC
Upper Occoquan Service Authority (http://www.uosa-construction.org/)	Prince William County Service Authority (PWCSA)	VA	CU
Val Vista Water Treatment Plant (WTP)	City of Mesa	AZ	SMPC

Collaborative (URL, if available)	Interviewed Entity (if different)	State	Interviewer(s)
Virginia Water and Waste Authorities Association (VWWAA) (http://www.bcpsa.com/vwwaa/)	Prince William County Service Authority (PWCSA)	VA	CU
Washington Metropolitan Area Water Supply Coordination	Fairfax Water	DC	CU
Water Service & Economic Development	Cleveland Division of Water	OH	SMPC
Water Technical Advisory Committee (TAC)	Detroit Water and Sewerage Department (DWSD)	MI	CU

Data Organization and Analysis.

The data from Phase 2 was compiled in text form in separate documents for each collaborative. The information from these documents was then compiled into a multiple spreadsheets within a workbook. The organization was selected to enable easy sorting of the information to facilitate the identification of overall characteristics of the collaboratives and any correlations between the information category. Many of the interviews were missing responses to some of the questions. Additional web research was conducted in an attempt to fill in the missing information. For example, several collaborations lacked a complete list of collaborators, their type, and the population served by each. For responses that referred to answers to previous questions, the appropriate information was copied into the additional section.

Colorado Survey of Water and Wastewater Utilities

The goal of this phase of the project was to further evaluate existing regional collaborations among water and wastewater utilities in Colorado. The information is desired in order to provide helpful information for utilities interested in regional collaboration efforts. The information compiled included the collaborations several utilities were involved in, the functional areas that utilities collaborate on, lessons learned and the benefits from these collaborations. The data collected to support the research were conducted in two primary phases, followed by analysis. More specific information on these processes are provided in the following sections.

Online Survey

In February 2012, a survey (for complete survey see Appendix A) was created using www.surveymonkey.com and emailed to several utilities via existing relationships, membership lists, the RMWEA monthly newsletter, and also posted as a link on several water and wastewater utility professional association websites. Extra effort was made to include wastewater utilities since they were lacking representation in the nationwide AWWA study. This online survey identified 105 examples of collaborative efforts from 26 different utilities, and collected data on the areas of collaboration for each utility, the sizes of each collaboration, and the governance structures for each collaboration. A list of these collaboratives is summarized in the Appendix. The bulk of the survey used check-boxes with options based on trends from the AWWA inventory rather than open responses boxes. This survey also

identified 18 utilities willing to participate in follow-up phone interviews. If most larger towns can be assumed to have a water and/or wastewater utility, there are likely about 270 such towns in Colorado and therefore the 26 responses represent about 9% response rate.

Follow-Up Interview

The 18 utilities that had volunteered to participate in a follow-up interview were contacted via phone. The goal of these interviews was to gather additional information on each collaboration and determine the impact of the relationship with the collaborations on each utility. The follow-up interviews collected information similar to the AWWA Phase 2 interviews including basic description and objectives of each collaboration, the date the collaboration officially initiated, the frequency of meetings and financial management. These interviews also asked each utility about general outcomes and benefits achieved through any or all of the collaborations, critical factors leading to success for the utility's involvement in any or all of the collaborations, key challenges/constraints, and significant roadblocks/barriers that others should be aware. In addition, the concept of missed opportunities was addressed, asking each utility if there were areas that they felt their utility/others should be collaborating in or have failed in collaboration attempts. The 18 utilities contacted provided information on 51 different collaboratives (with some utilities describing the same collaborative).

The follow-up interviews were solely conducted by graduate student Tamara Relph in 2012 and 18 phone interviews were completed. The interview method remained constant, and unlike the AWWA Phase 2 interviews, the questions were not emailed prior to the scheduled interview. The interviews were conducted over the phone and typically lasted 20 minutes.

Note: After 12 interviews were completed, a new question was added to the follow-up interview, asking utilities if there were other collaborations that they were involved in that weren't listed in the initial survey. The survey had room for utilities to list up to 5 collaborations and then a box for other responses, where over 25% of survey respondents listed additional collaborations. At the time of the design for the survey, it was thought that the majority of utilities would be involved in 5 or less collaborations, per the data from the prior AWWA study.

Data Organization and Analysis

The information from the online survey was compiled into multiple spreadsheets within a workbook. The data from the follow-up interviews was compiled in text form in separate documents for each utility. Some surveys and interviews were from multiple responders from the same utility, this information was combined in the spreadsheets and text files for analysis. Any differences in values for responses from the same utilities were resolved by additional web research. Most of the surveys were not missing responses to any of the questions. Additional web research was conducted to minimize the amount of time needed for the phone interviews.

CHAPTER 5: DATA ANALYSIS & RESULTS

This section summarizes and compares the data from both the AWWA National Inventory and the Colorado Surveys. Information discussed includes general information, drivers for collaboration, areas of collaboration, governance types, financial management, benefits of regional collaboration, and lessons learned. Some advice and missed opportunities provided in the surveys is also presented. This section concludes with several case studies of regional collaborations.

GENERAL INFORMATION

This section summarizes some of the main characteristics of the collaboratives.

TABLE 6. TYPES OF COLLABORATIONS AND UTILITIES SURVEYED IN BOTH STUDIES

	# Collaborations		# Utilities	
	National	Colorado	National	Colorado
TOTAL	**45**	**105**	**171**	**26**
Primarily DW focus	29	24	85	4
Primarily WW focus	4	35	9	11
Both DW and WW	12	46	87	11

PARTICIPANTS IN COLLABORATIONS

Research Questions Addressed

1. How common is municipal water or wastewater utility involvement in regional collaborations?
   a. Do the majority of water and wastewater utilities participate in at least 1 collaboration?
   b. Is collaboration equally common in the drinking water and wastewater sectors?

Each of the collaboratives interviewed in the AWWA National Inventory provided a roster of their members. The total number of individual entities participating in each of the 45 collaboratives ranged from 2 to 115 (Figure 1), with a median collaborative size of 7. A total of 696 different entities were represented among the 45 surveyed collaboratives. The largest collaborative was the Metropolitan North Georgia Water Planning District. Out of the 696 entities, a total of 37 member agencies were involved in 2 or more collaborations, and 10 of these are water or wastewater utilities.

Each utility from the Colorado surveys provided an estimate of the numbers of collaborators in each of the collaborations with which the utility is involved. The options for these responses included between 2 to 5, 6 to 9, 10 to 19, 20 to 29, or more than 30 collaborators (Figure 2). The majority of collaborations either had between 2 to 5 collaborators (41%) or more than 30 collaborators (29%). A total of 105 different collaborations were represented among the 26 surveyed utilities. In general, fewer of the Colorado collaborations included a "middle" number of participants.

Figure 3 shows the utility focus for collaboratives in the AWWA National Inventory that involved water and/or wastewater utilities. Water authorities that provide both water and wastewater services were counted as 0.5 each as a water utility and wastewater utility. Most collaboratives included entities that dealt with both drinking water and wastewater, although the focus of the collaboration itself was more commonly on drinking water issues. Figure 4 shows the utility focus from the Colorado Surveys. As expected, since the survey was specifically sent to several wastewater utilities, there were many responses in that category, unlike the AWWA National Inventory that had no wastewater-specific utilities.

Figure 5 shows the general types of collaborations, whether these collaboratives were only comprised of utility member agencies, non-utility member agencies, or both. Most collaboratives included both utilities and other

types of partners. Member agencies were divided into 4 different categories: water utility, wastewater utility, town/city/county, or other collaborators (Figure 6). Other participants in the collaboratives included universities, independent corporations, and government agencies such as the US Environmental Protection Agency (EPA) or the US Fish and Wildlife Service (157 entities or 23%). Each collaborative included between 0 and 24 "other" participants. The median number of "other" participants in the collaboratives was 2. Town/city/county collaborators could involve the town, city, or county water or wastewater utilities as well, but unless the member entity was specifically defined as a water or wastewater utility it was not counted in the water or wastewater utility collaborator categories.

The Colorado utilities reported involvement between 1-17 collaborations, with the majority involved in 5 (24%) or 3 (20%) collaborations (Figure 7). However, these values could be biased since the survey was designed with only five spaces for collaborations. Many utilities may have only reported their top five or less collaborations in which they were involved. This was confirmed for several utilities during the phone interviews, once the survey limitations were realized. A new question was added to the interview to determine if there were additional collaborations the utilities were involved in that hadn't been reported on the survey.

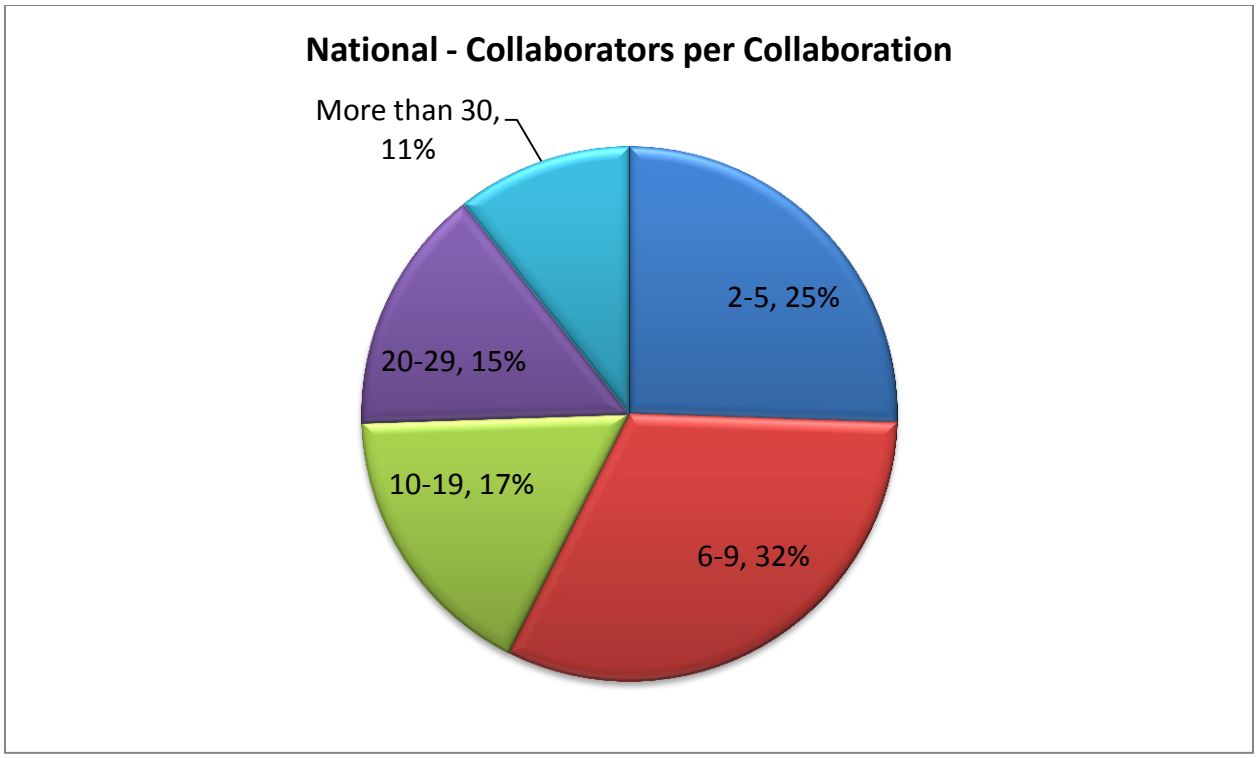

FIGURE 1. NATIONAL – COLLABORATORS PER COLLABORATIVE

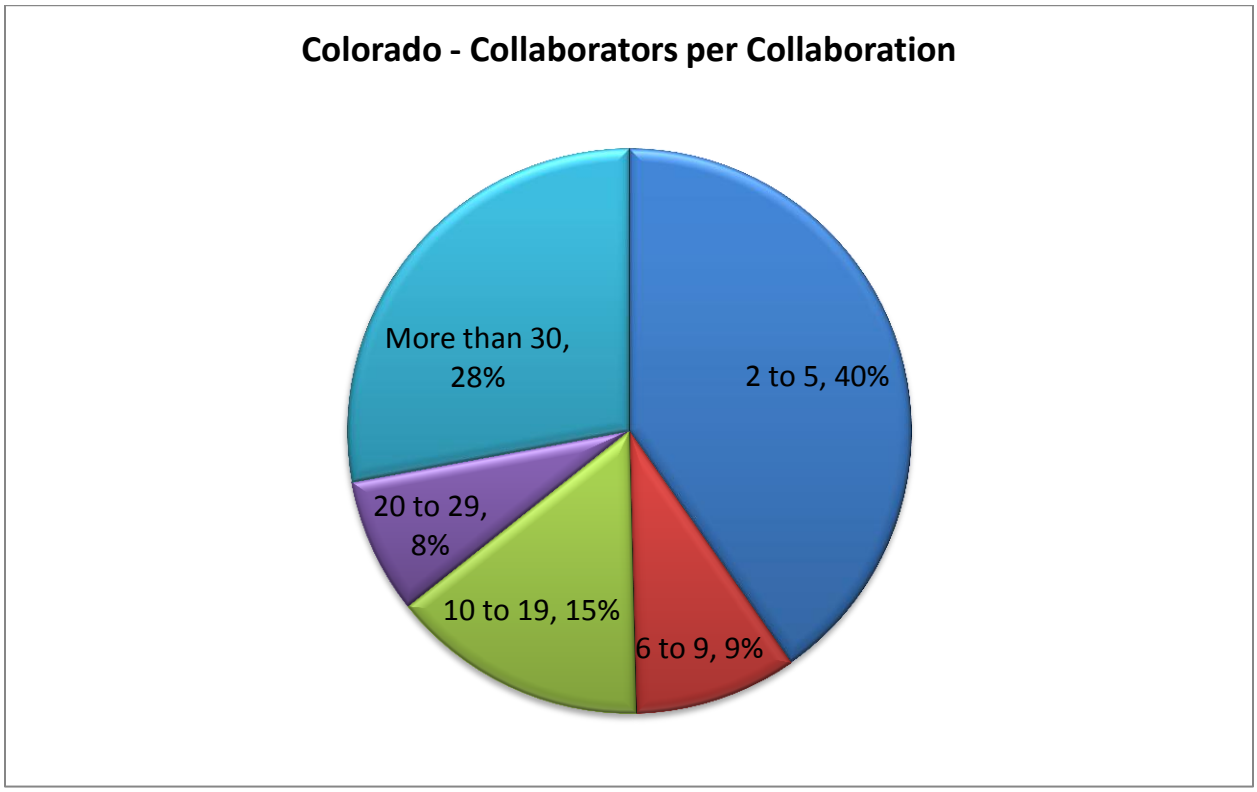

FIGURE 2. COLORADO - COLLABORATORS PER COLLABORATION

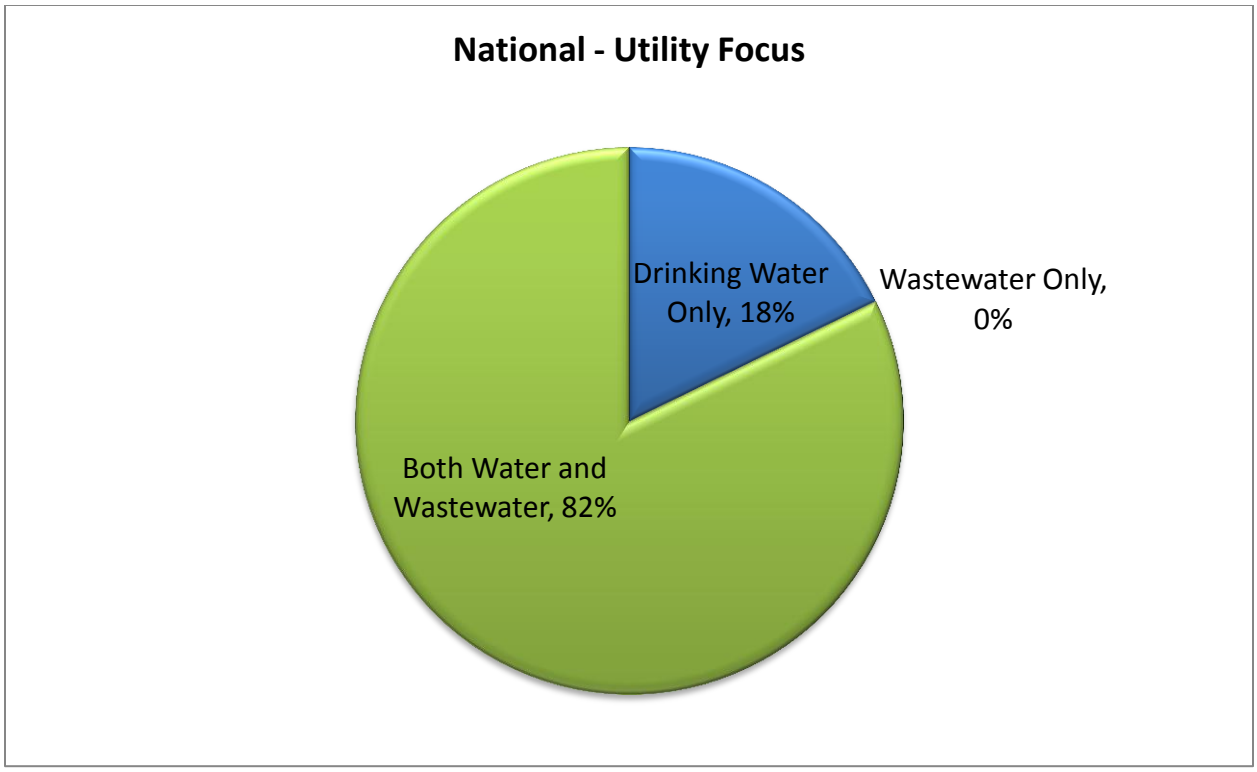

FIGURE 3. NATIONAL – UTILITY FOCUS FOR COLLABORATIONS WITH WATER OR WASTEWATER UTILITY PARTICIPANTS

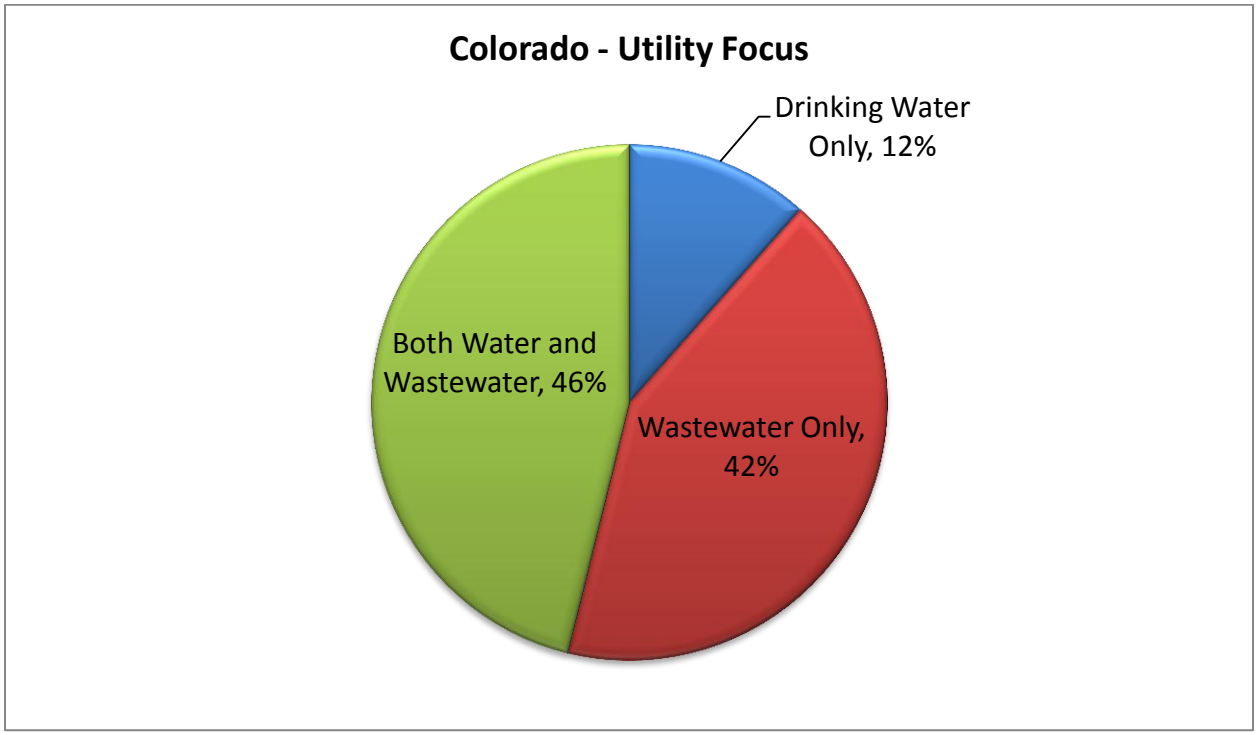

FIGURE 4. COLORADO - UTILITY FOCUS

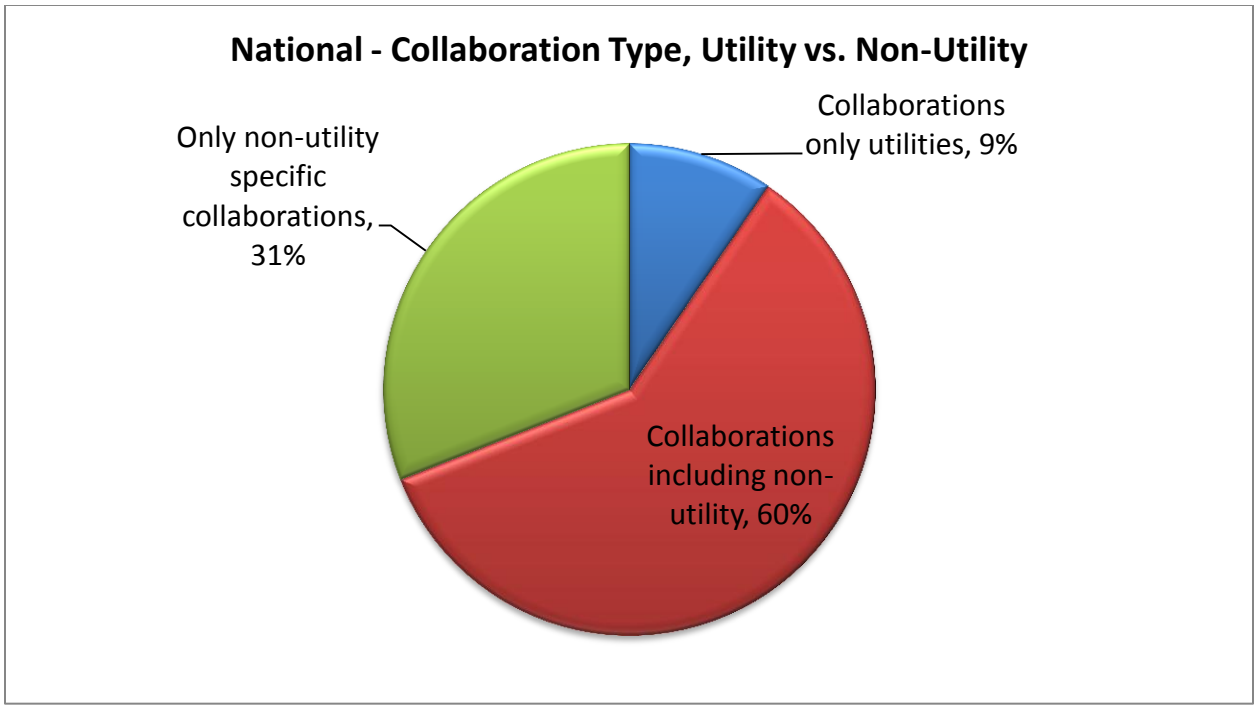

FIGURE 5. NATIONAL - NUMBER OF THE 45 COLLABORATIVES COMPRISED OF DIFFERENT TYPES OF ENTITIES.

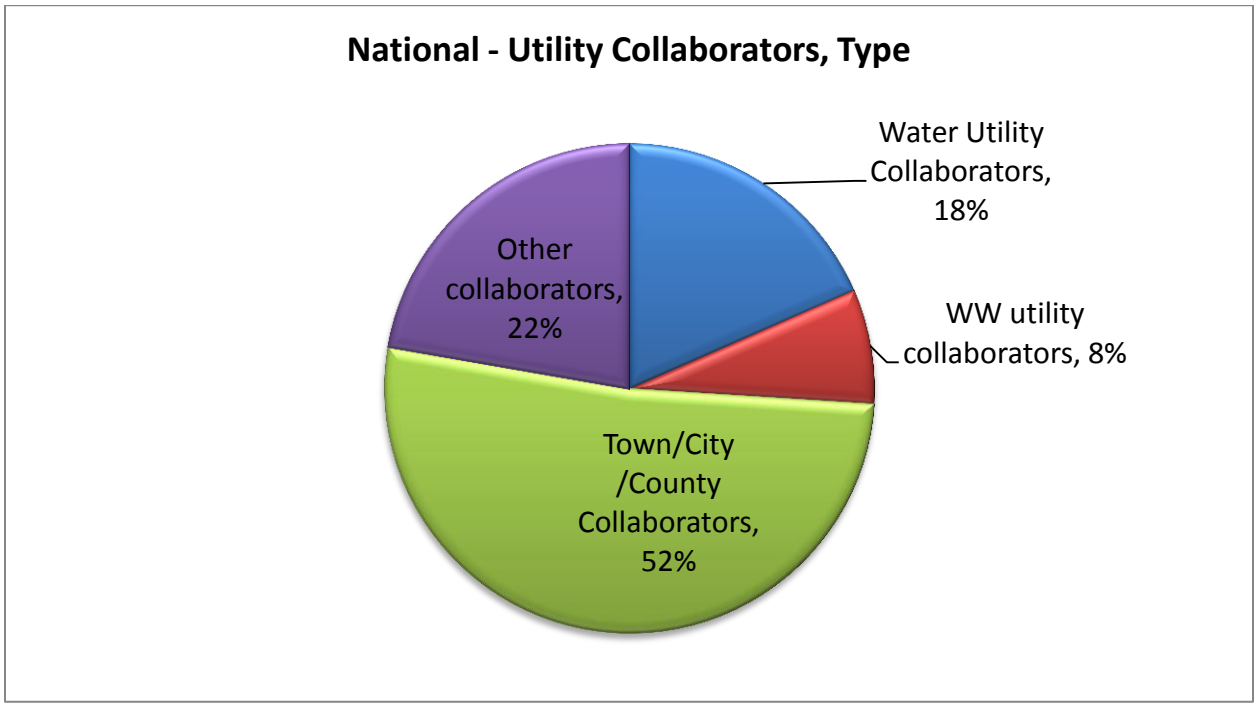

FIGURE 6. NATIONAL - NUMBERS OF DIFFERENT TYPES OF ENTITIES PARTICIPATING IN THE 45 COLLABORATIVES

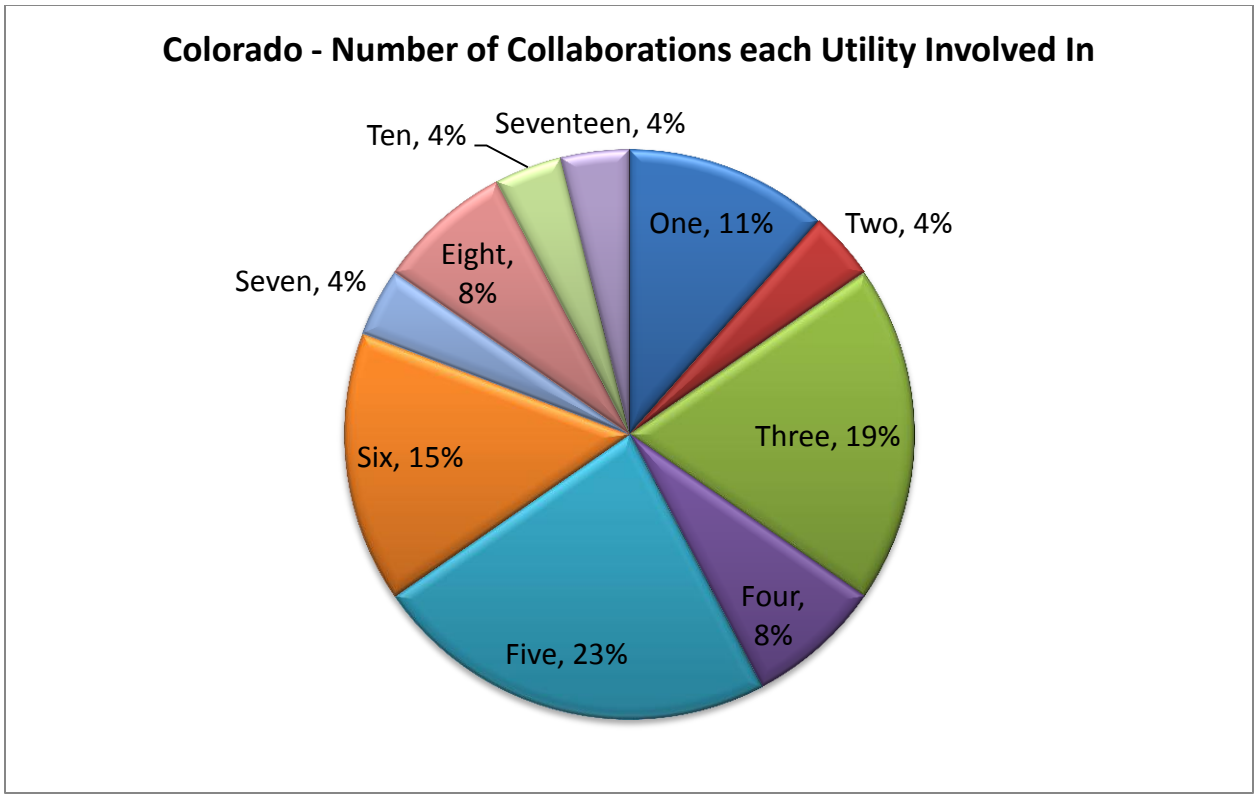

FIGURE 7. COLORADO - NUMBER OF COLLABORATIONS EACH UTILITY INVOLVED IN

The national survey was not designed to probe the number of different collaborations that a single utility participated in. Even still, It was driven from the perspective of the collaboratives. For the Colorado surveys, several collaborations were reported by multiple utilities, but the majority were utility specific, with 79% reported solely by 1 utility surveyed and only 16% by at least 2 utilities (Figure 8). One collaboration, the Colorado Wastewater Utility Council, was reported by 9 different utilities, likely because the member list for the Colorado Wastewater Utility Council was one of the sources used to send out the online survey. Based on the website for the Colorado Wastewater Utility Council (http://cwwuc.org/), there are 49 utilities who are members.

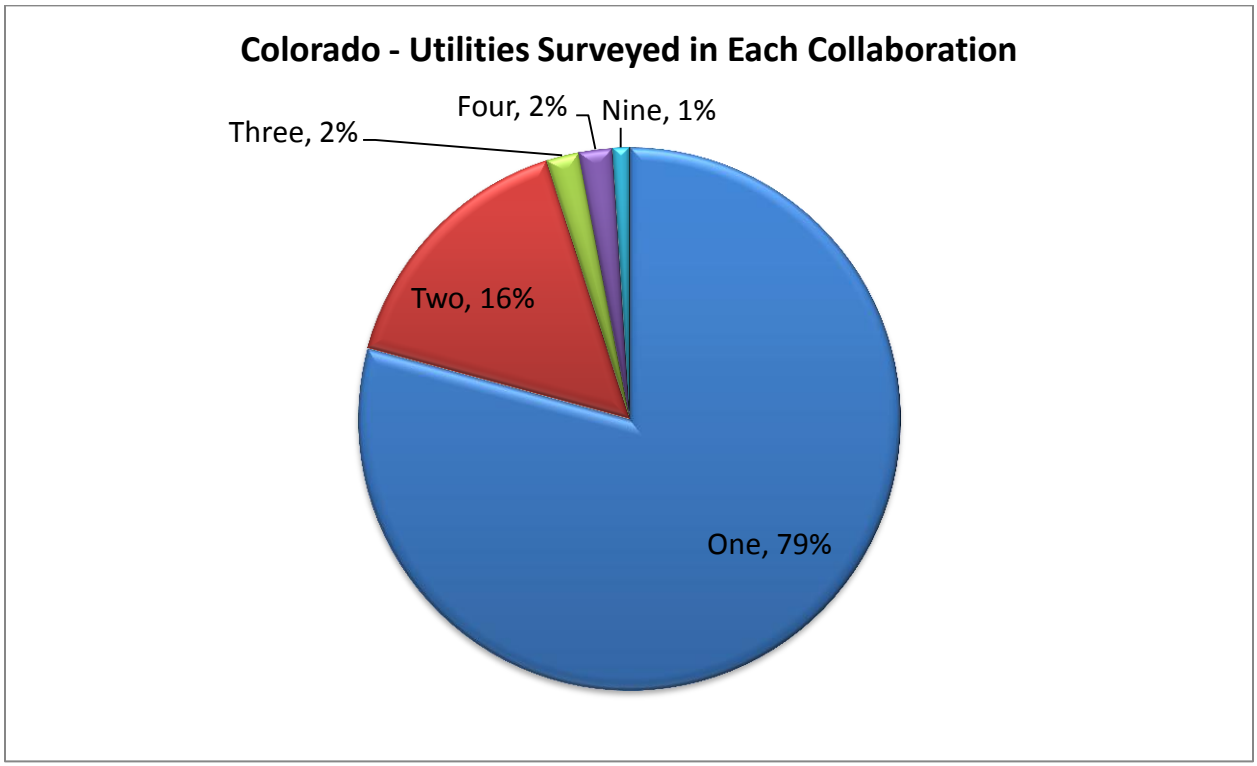

FIGURE 8. COLORADO - UTILITIES SURVEYED IN EACH COLLABORATION

AGE OF COLLABORATIONS

Research Questions Addressed

2. How long have utilities been involved in regional collaborations?

There is also a widespread range for the dates that the surveyed collaboratives were formed, with only a few formed in the last couple of years. Figure 9 shows the number of years since each collaborative in the AWWA National Inventory was founded. Several collaboratives were founded between 3-5 years ago, 6-10 years ago, and 10 collaboratives began more than 20 years ago. The oldest collaborative was the Metropolitan Washing Council of Governments – Prince William County Service Authority founded in 1957. Figure 10 shows the number of years since each collaborative from the Colorado survey was founded. Several collaboratives were founded between 21-40 years ago. The oldest collaborative surveyed was the City of Longmont's collaboration between the water and wastewater utilities and Longmont Power & Communication, founded exactly 100 years to the day at the time of the interview. Long-standing collaborations indicate a successful collaboration that has retained its usefulness to members. On average, the collaboratives represented in the Colorado study were older than those in the National survey.

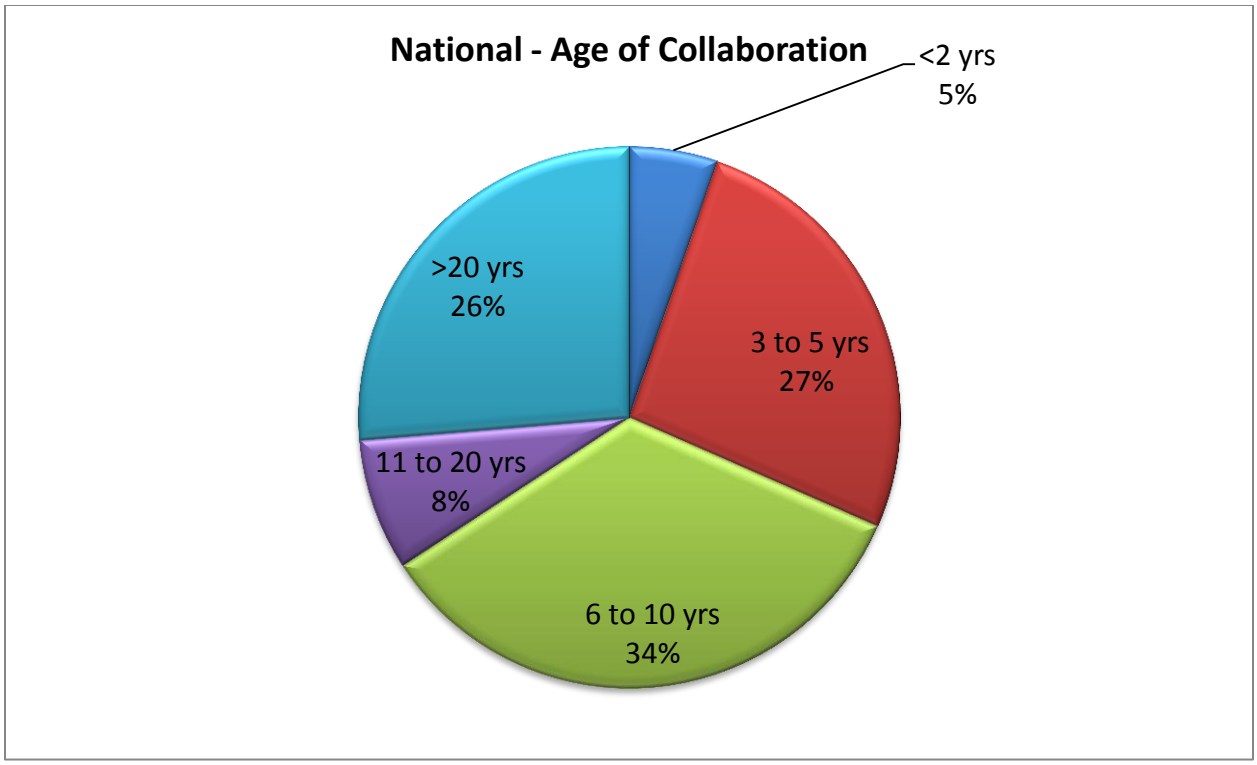

FIGURE 9. NATIONAL – AGE OF COLLABORATION (AMONG 45 COLLABORATIVES)

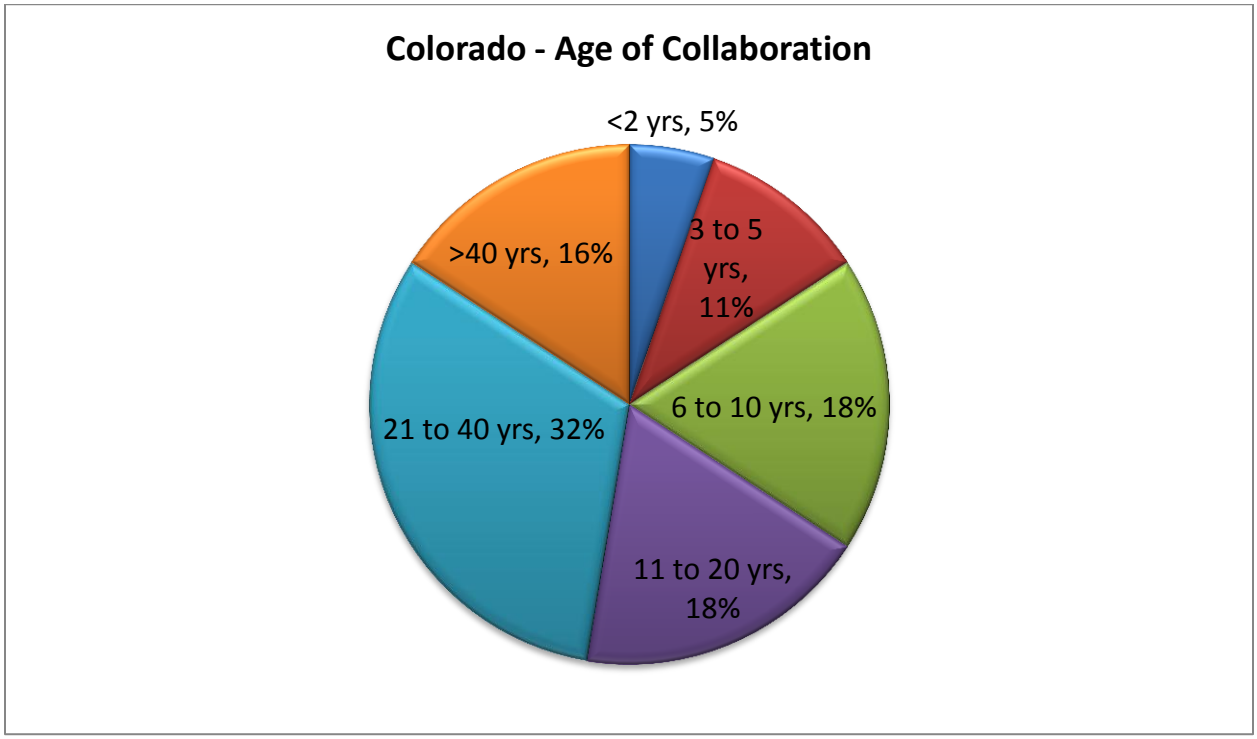

FIGURE 10. COLORADO - AGE OF COLLABORATION (AMONG 39 COLLABORATIVES)

LOCATION OF COLLABORATIONS

Research Questions Addressed

3. What are typical geographic constraints of regional collaborations?
    a. Can collaborations cross geo-political boundaries (i.e. state lines, county lines)?

The states where each collaborative from the AWWA National Inventory is primarily located in is shown in Figure 11. Eighteen different states (including Washington DC) are represented. Both coastal areas are well represented, but there are few examples from the Midwest and northwestern states. In most collaboratives all of the participants are in a single state, but there are a few exceptions for water basins that cross state lines. The Catawba-Wateree Water Management Group has members in both North Carolina and South Carolina. The ACF (Apalachicola-Chattahoochee-Flint basin) Stakeholders includes entities in Georgia, Alabama, and Florida. Also, the Potomac River Basin Drinking Water Source Protection Partnership includes agencies in Maryland, Washington DC, Virginia, Pennsylvania, and West Virginia.

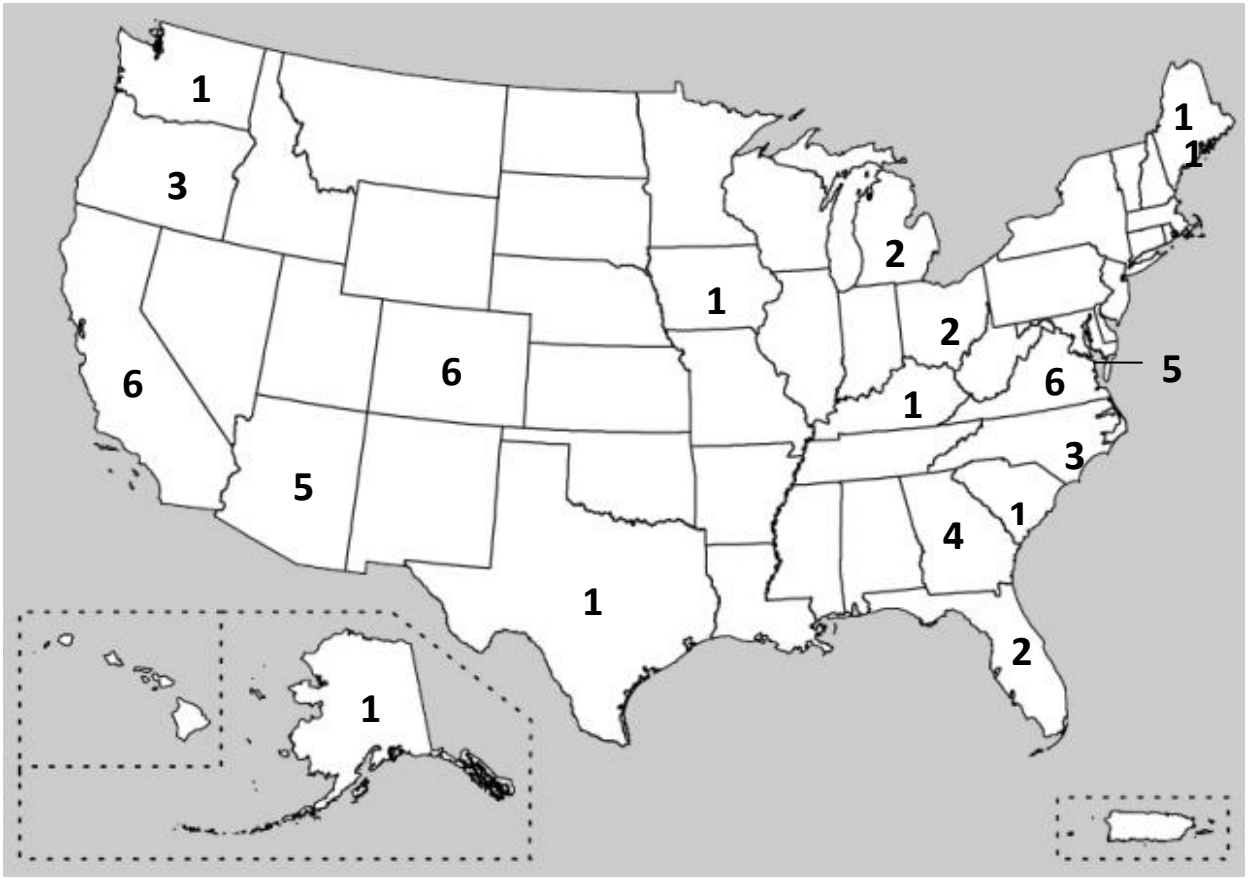

FIGURE 11. NATIONAL - COLLABORATION LOCATIONS

The location of each Colorado utility that responded to the online survey is shown in Figure 12. Twenty-five different utilities are represented. The Front Range area is well represented, but there are few examples from the Western slope and the eastern side of the state. Although there is a perception that regional collaborations are likely to be closely co-located geographically, several examples exist of more distant collaborations. For example, the Colorado Wastewater Utility Council involves collaborations with nearly all of the surveyed utilities; some located over 270 miles away.

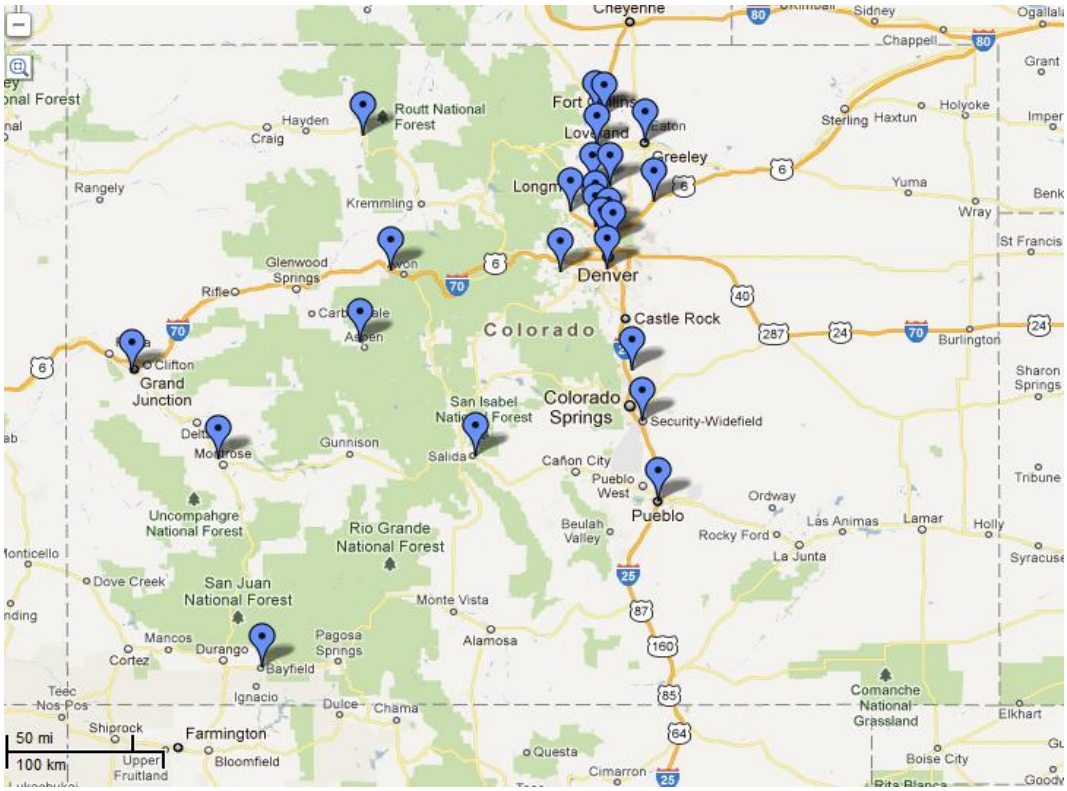

FIGURE 12. COLORADO - UTILITIES LOCATIONS

POPULATION SERVED

Research Questions Addressed

4. What size of utility typically participates in regional collaborations?

The population served by the utilities and/or municipal entities within each collaborative were determined for both studies. For the AWWA National Inventory, these populations were rarely provided in the interview information and, when possible, were determined using US Census Data (U.S. Government, 2010); (IDcide.com, 2010). Figure 13 shows the populations served by several of the utilities involved in collaborations from the AWWA National Inventory. Figure 14 shows the utility populations served provided in the Colorado surveys. In both studies utility service populations ranged from 2,000 to 4.1 million people. The total population served of all surveyed collaborations in Colorado amounted to 3,092,800 people, representing, 60.4% of the total population in the state of Colorado (U.S. Government, 2010). When the populations of the individual entities, utility and non-utility, within a collaborative from the National AWWA inventory were summed, 37 of the 45 collaboratives served 0.5 million to 10 million people (Figure 15). The largest collaborative in our study served ~36 million people via the Multi-Agency Benchmarking Program described by the Los Angeles Department of Water & Power (LADWP).

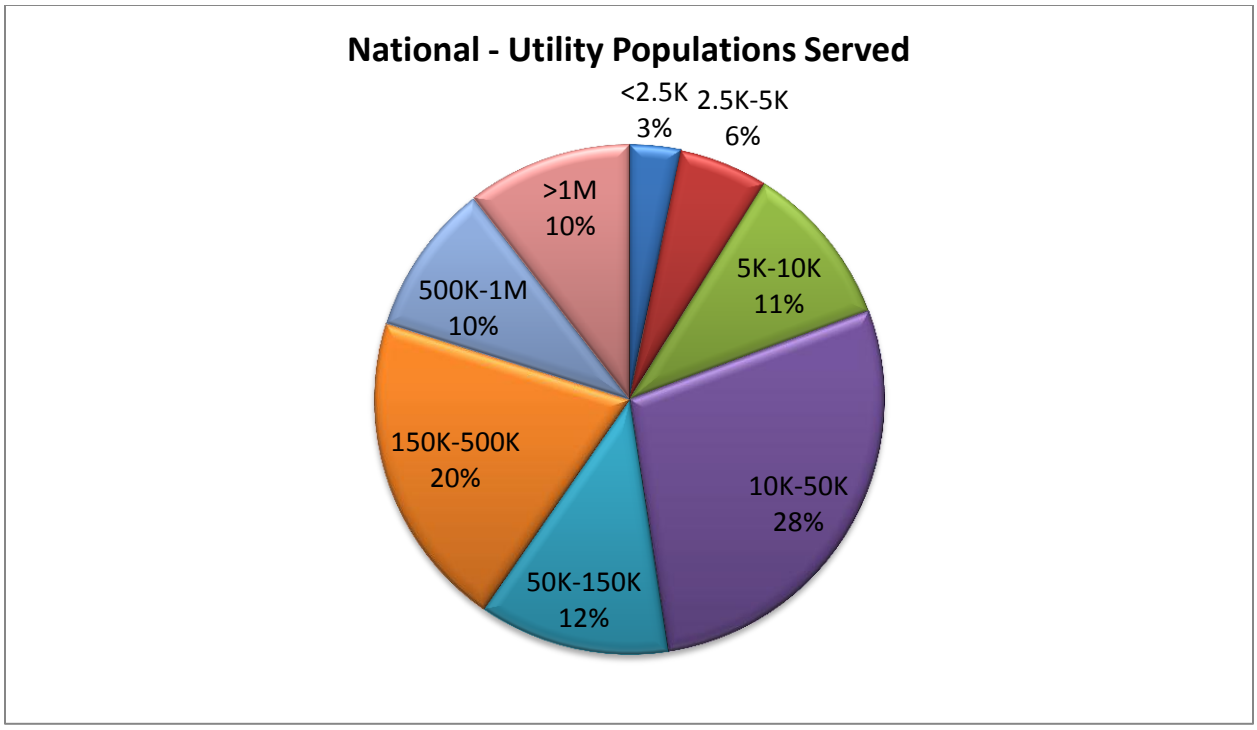

FIGURE 13. NATIONAL - UTILITY POPULATIONS SERVED

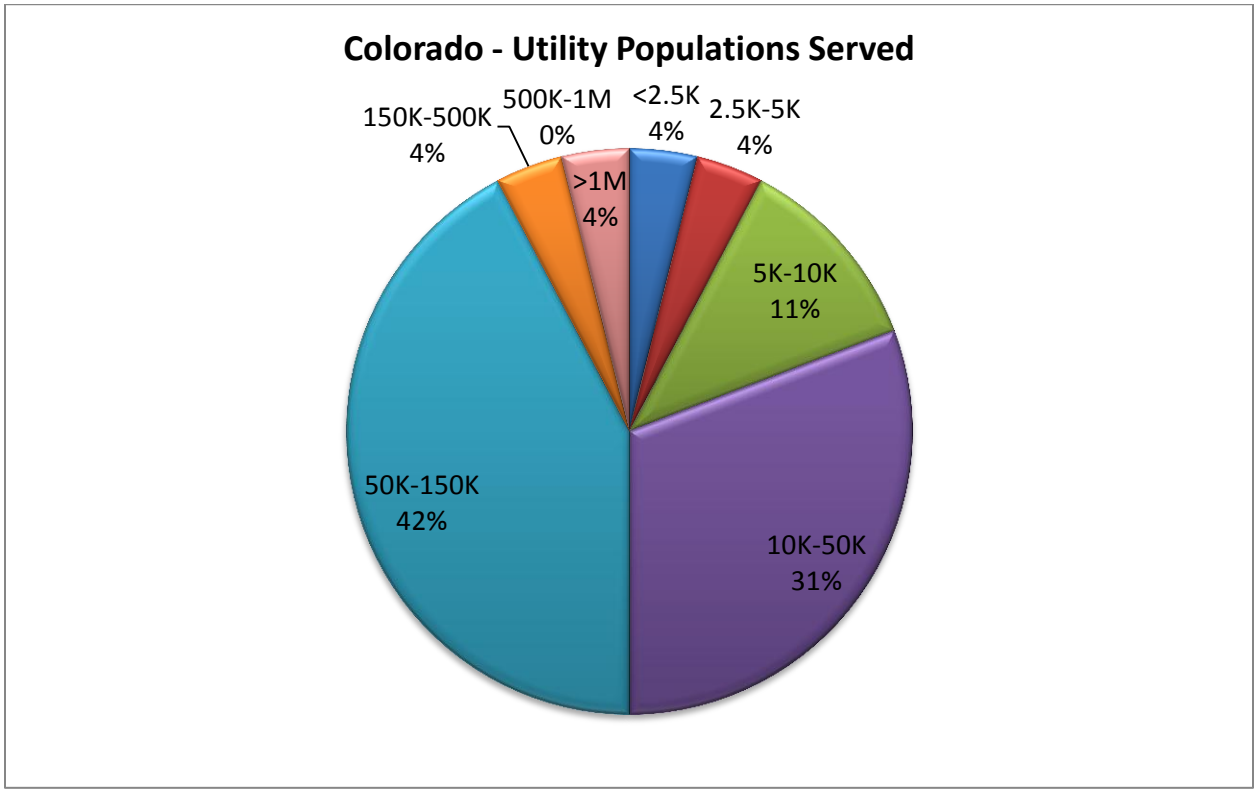

FIGURE 14. COLORADO - UTILITY POPULATIONS SERVED

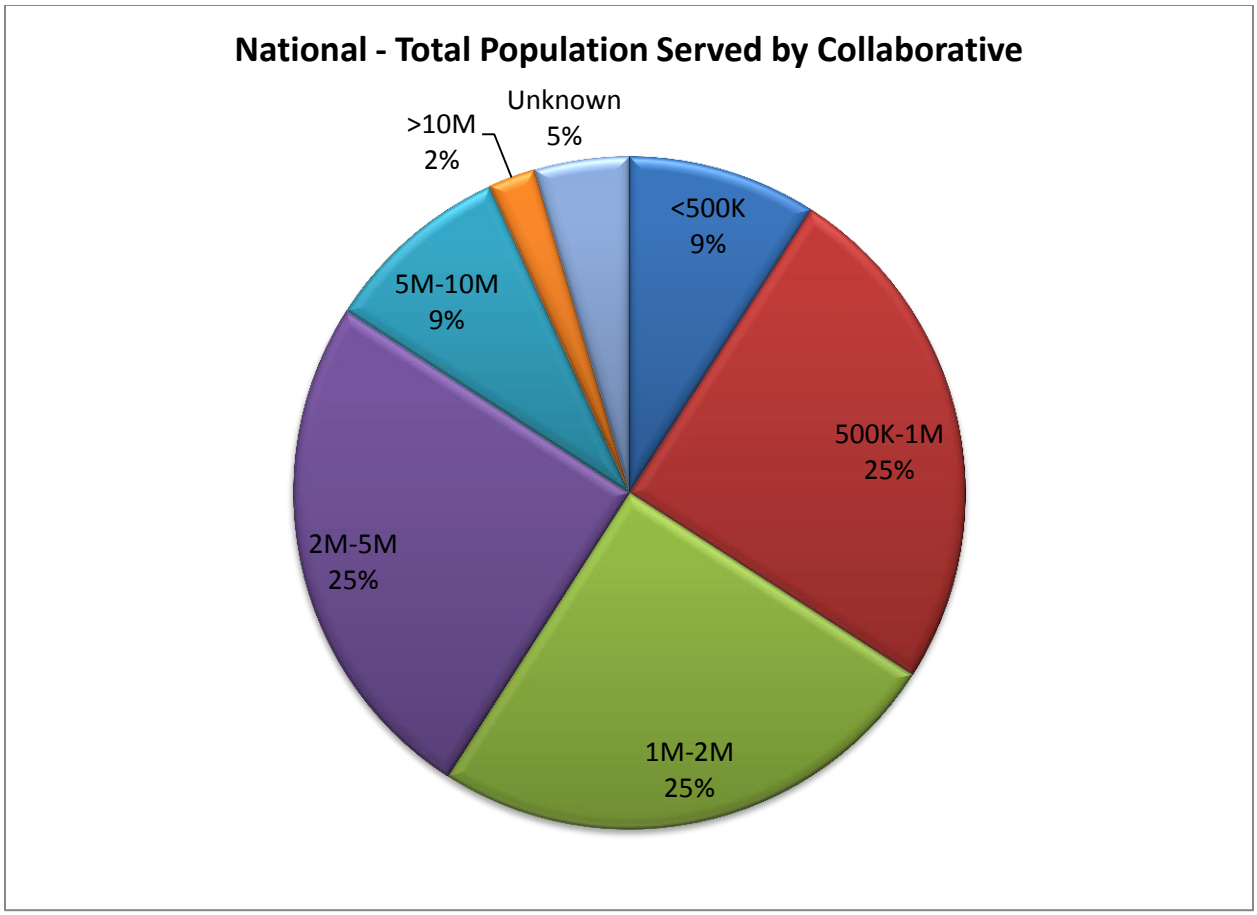

FIGURE 15. NATIONAL - TOTAL POPULATION SERVED BY COLLABORATIVE

DATA TRENDS

Several plots were generated comparing total populations served by the collaborations or utility, the ages of the collaborations, the number of member agencies involved, and the number of key collaboration areas to determine any possible trends. These values for the AWWA National Inventory was collaboration-specific whereas the values for the Colorado surveys were utility-specific, so not all have corresponding plots from the other study for comparison.

Figure 16 provides an overall illustration of the total number of entities in the collaborative versus the age of each collaborative, scaling each symbol illustrate the total population that the collaborative serves in the AWWA National Inventory.

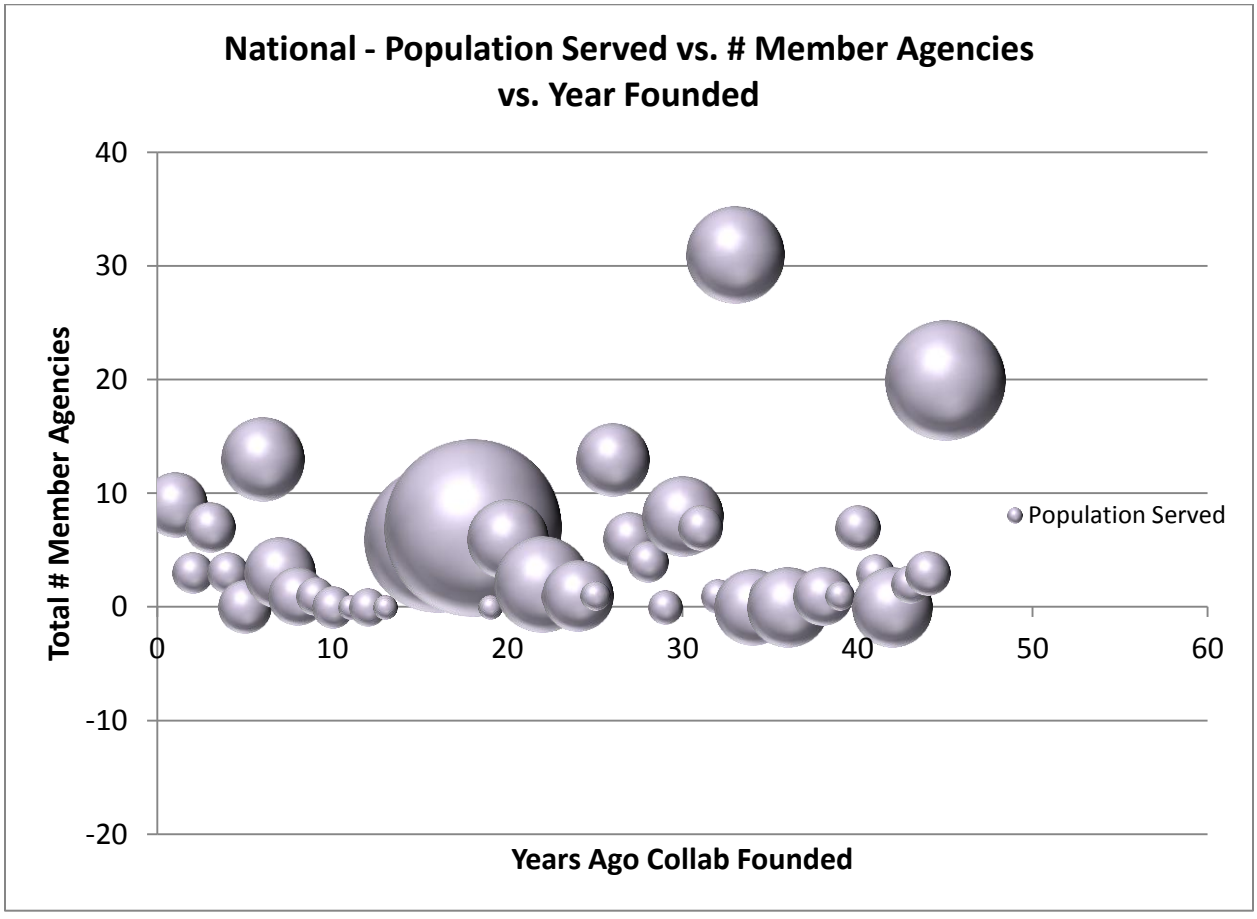

FIGURE 16. NATIONAL - ILLUSTRATES NUMBER OF ENTITIES VS AGE WITH SIZE OF EACH SYMBOL SCALED TO ILLUSTRATE POPULATION SERVED BY EACH COLLABORATIVE

Figure 17 shows the total population served by each of the 45 collaboratives from the AWWA National Inventory compared to the age of the collaborative. It was expected that the older collaboratives might serve a larger population due to growth over time, but that was not found to be the case.

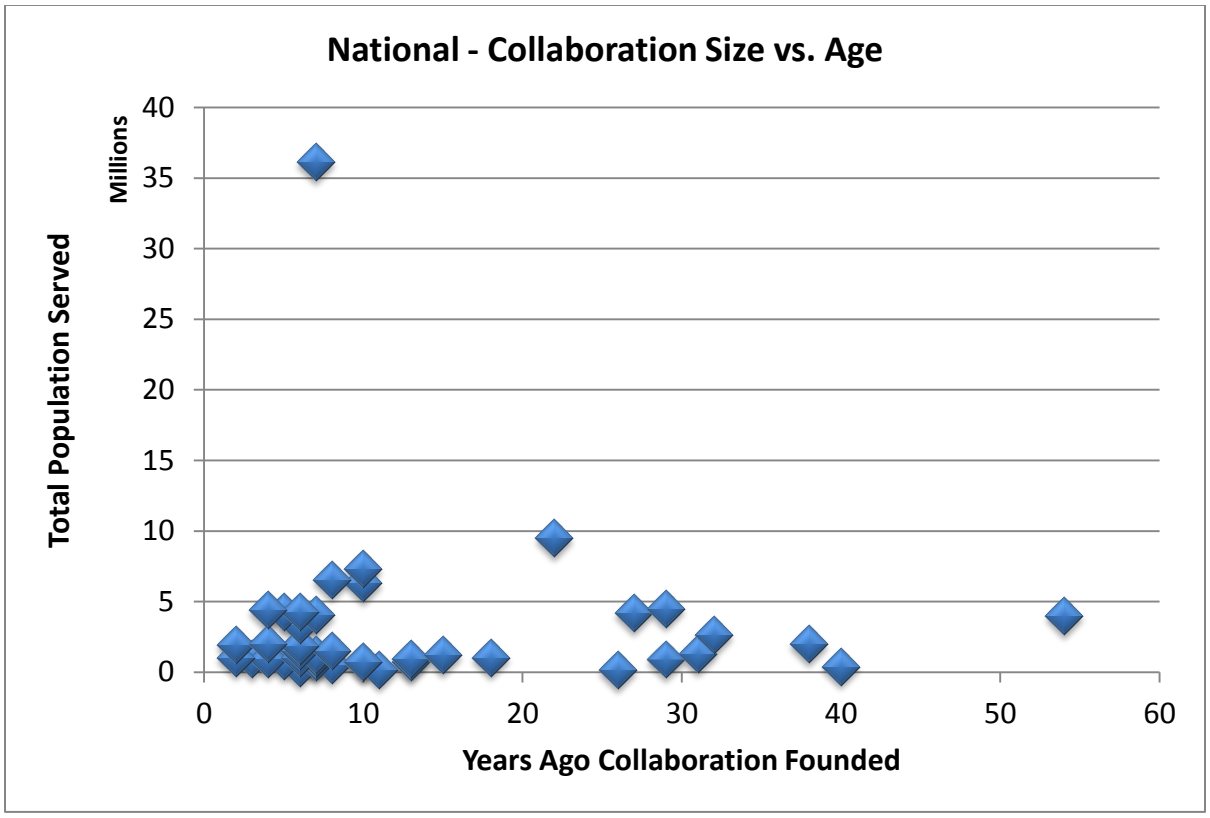

FIGURE 17. NATIONAL - TOTAL POPULATION SERVED BY EACH OF THE 45 COLLABORATIVES VERSUS THE AGE OF THE COLLABORATIVE

Figure 18 shows the total population served by each of the 45 collaboratives in the AWWA National Inventory compared to the total number of member agencies in each collaborative. It was expected that collaboratives with more members might serve larger populations, but that was not found to be the case.

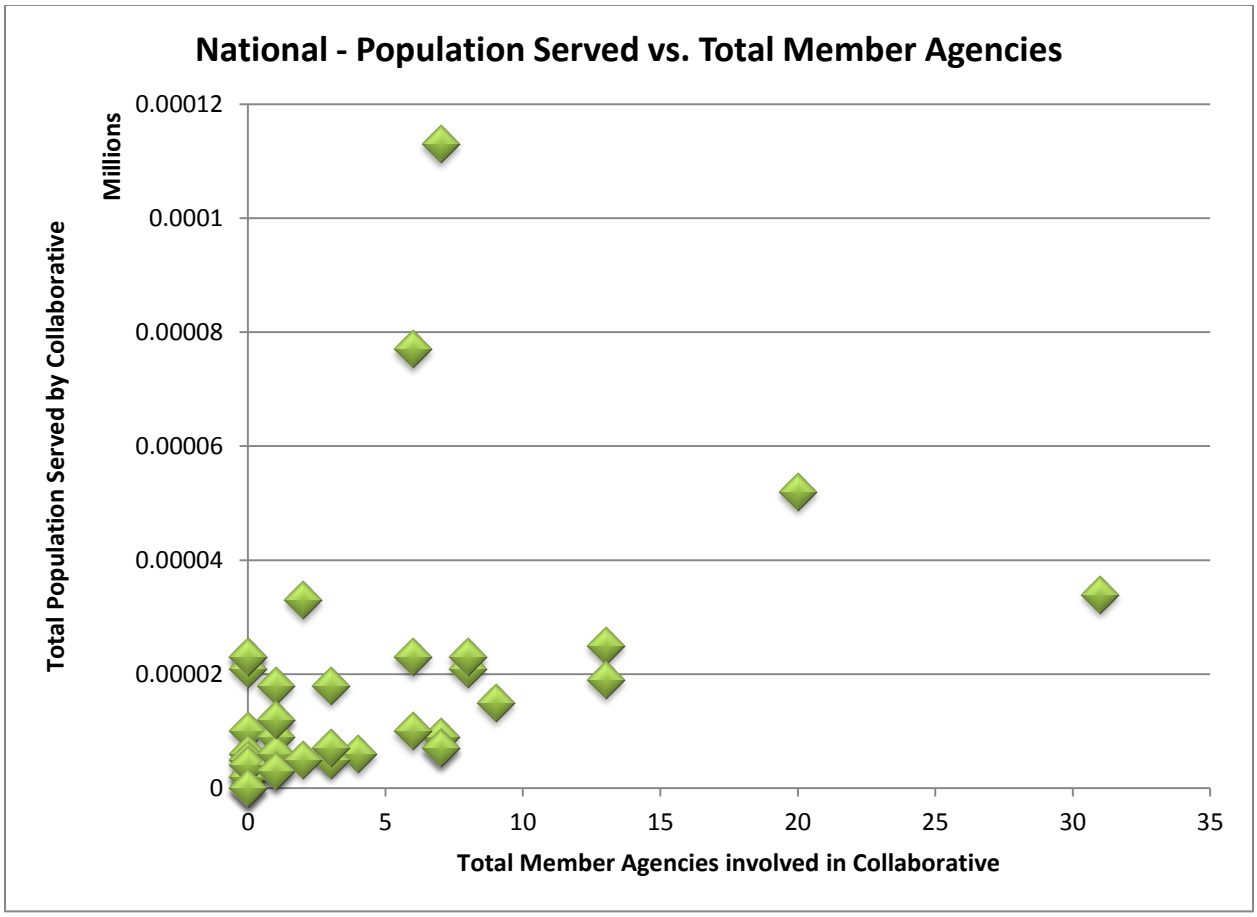

FIGURE 18. NATIONAL - TOTAL POPULATION SERVED VS. THE NUMBER OF ENTITES IN EACH COLLABORATIVE

The number of member agencies compared to the age of the collaboration was also compared for the AWWA National Inventory, as shown in Figure 19. It was expected that older collaboratives might be larger, due to the addition of members over time. This expected trend was not found.

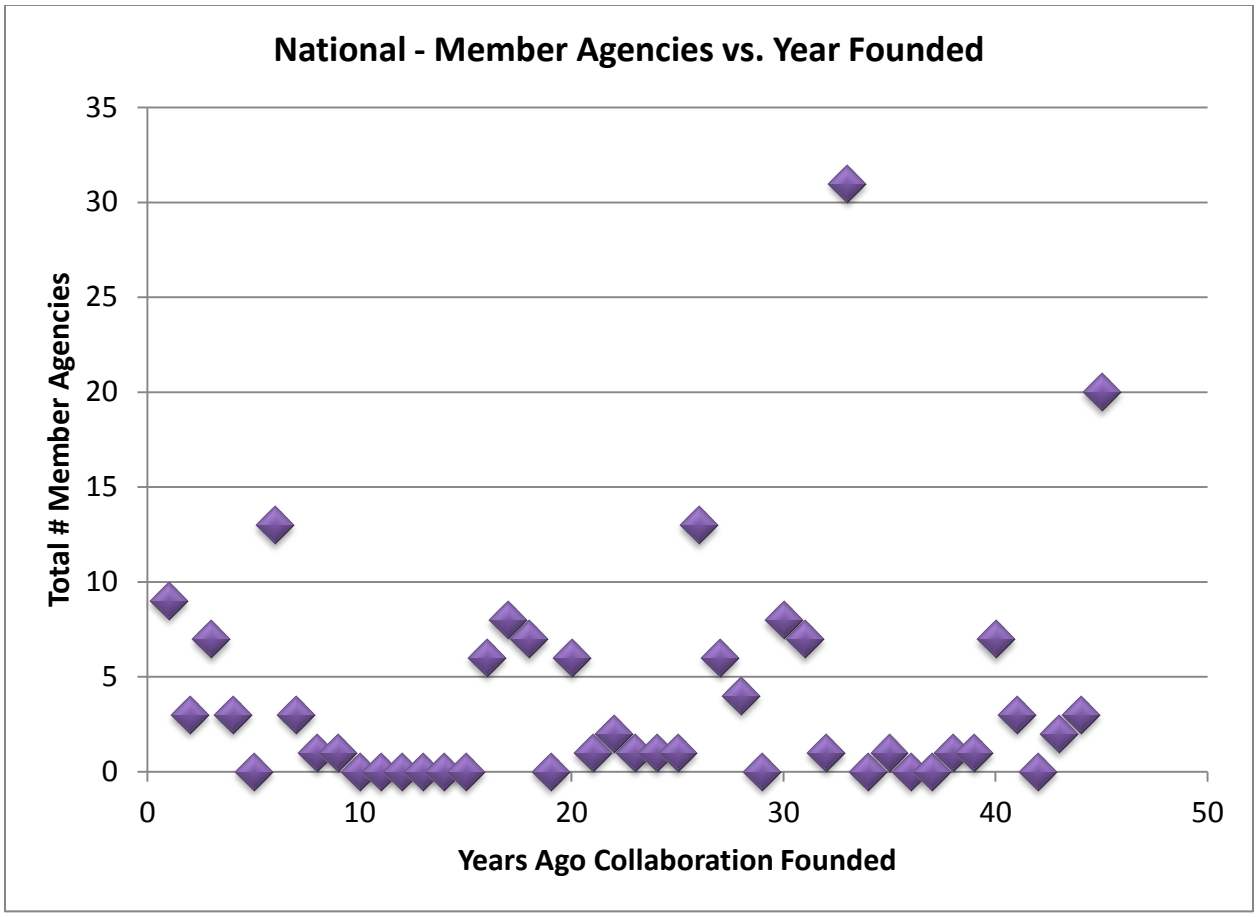

FIGURE 19. NATIONAL - MEMBER ENTITIES IN EACH COLLABORATIVE VS. AGE

An overview of utility involvement in collaborations, or the number of collaborations each utility in the Colorado surveys listed involvement in, compared with the total number of key collaboration areas per utility and the service populations of each utility is illustrated in Figure 20.

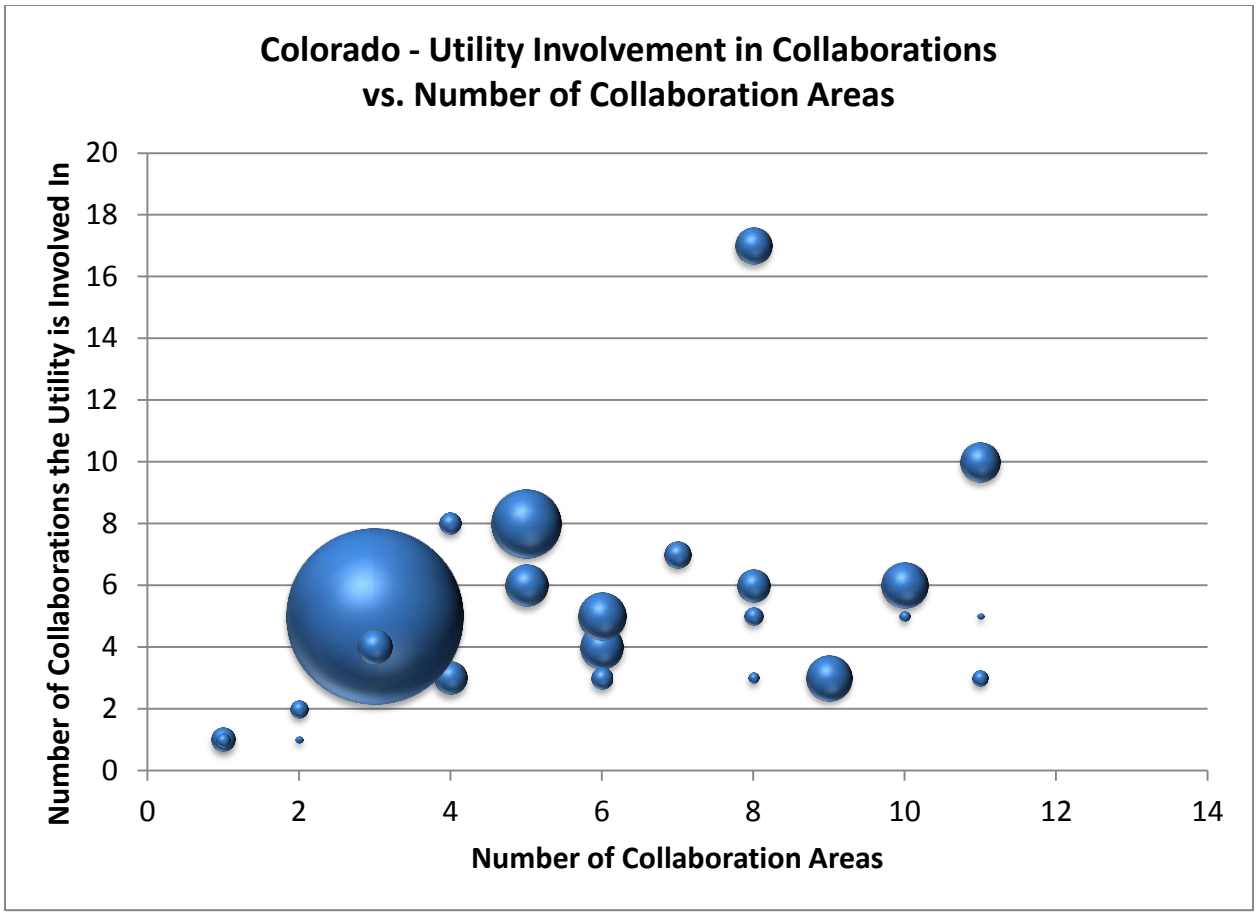

FIGURE 20. COLORADO - UTILITY INVOLVEMENT IN COLLABORATIONS VS. NUMBER OF COLLABORATION AREAS VS. UTILITY SIZE, WHICH IS ILLUSTRATED BY SCALED SIZE OF EACH SYMBOL

Figure 21 compares the number of collaborations that each utility is involved in with the size of the service population per utility. It was expected that the larger the service population the more collaborations the utility would be involved in, due to a greater range of needs. This trend was not found.

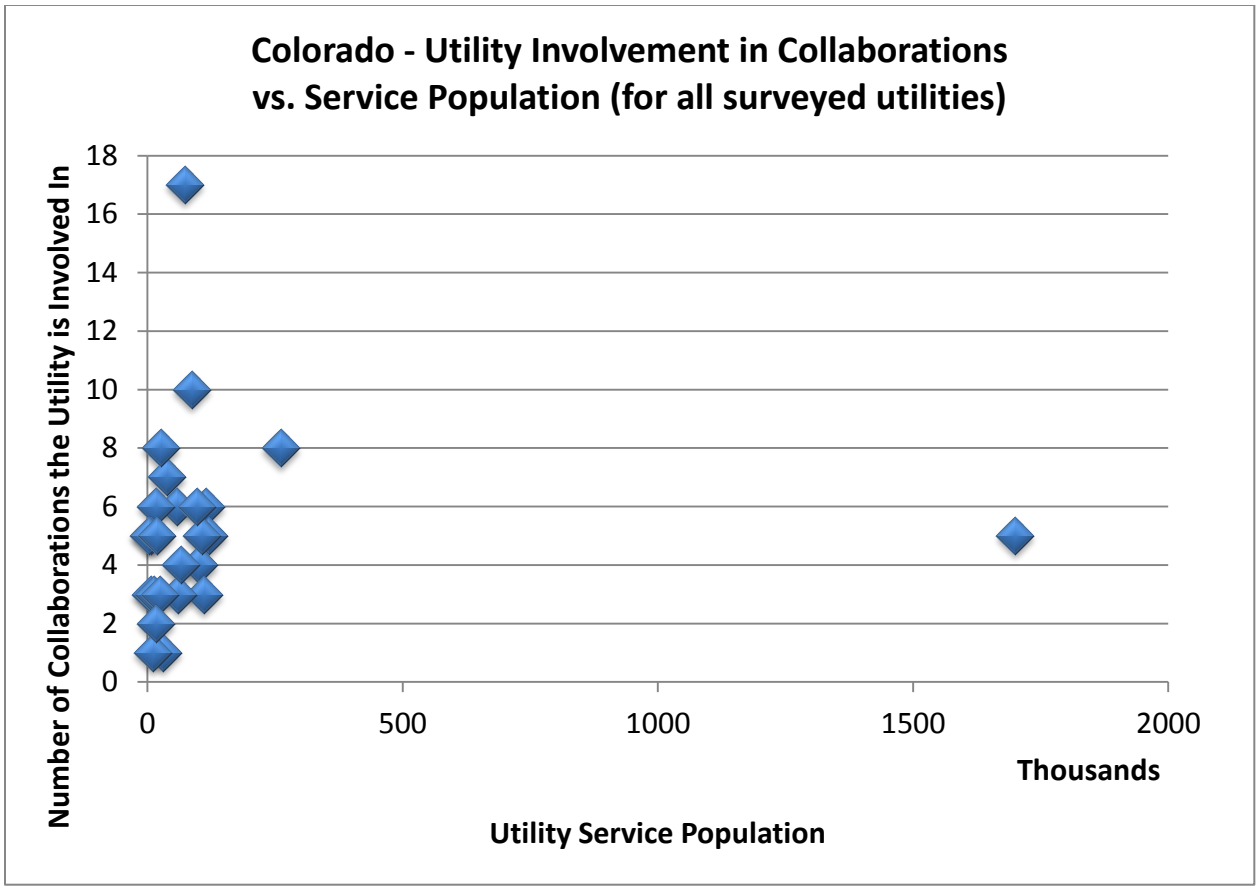

FIGURE 21. COLORADO - UTILITY INVOLVEMENT IN COLLABORATIONS VS. SERVICE POPULATION (INCL. ALL UTILITIES)

Figure 22 is similar to Figure 21, comparing the number of collaborations that each utility is involved in with the size of the service population per utility. However, it only looks at utilities from the Colorado surveys with populations served less than 150,000 since the majority of utilities fell in that category. There were still no observed trends.

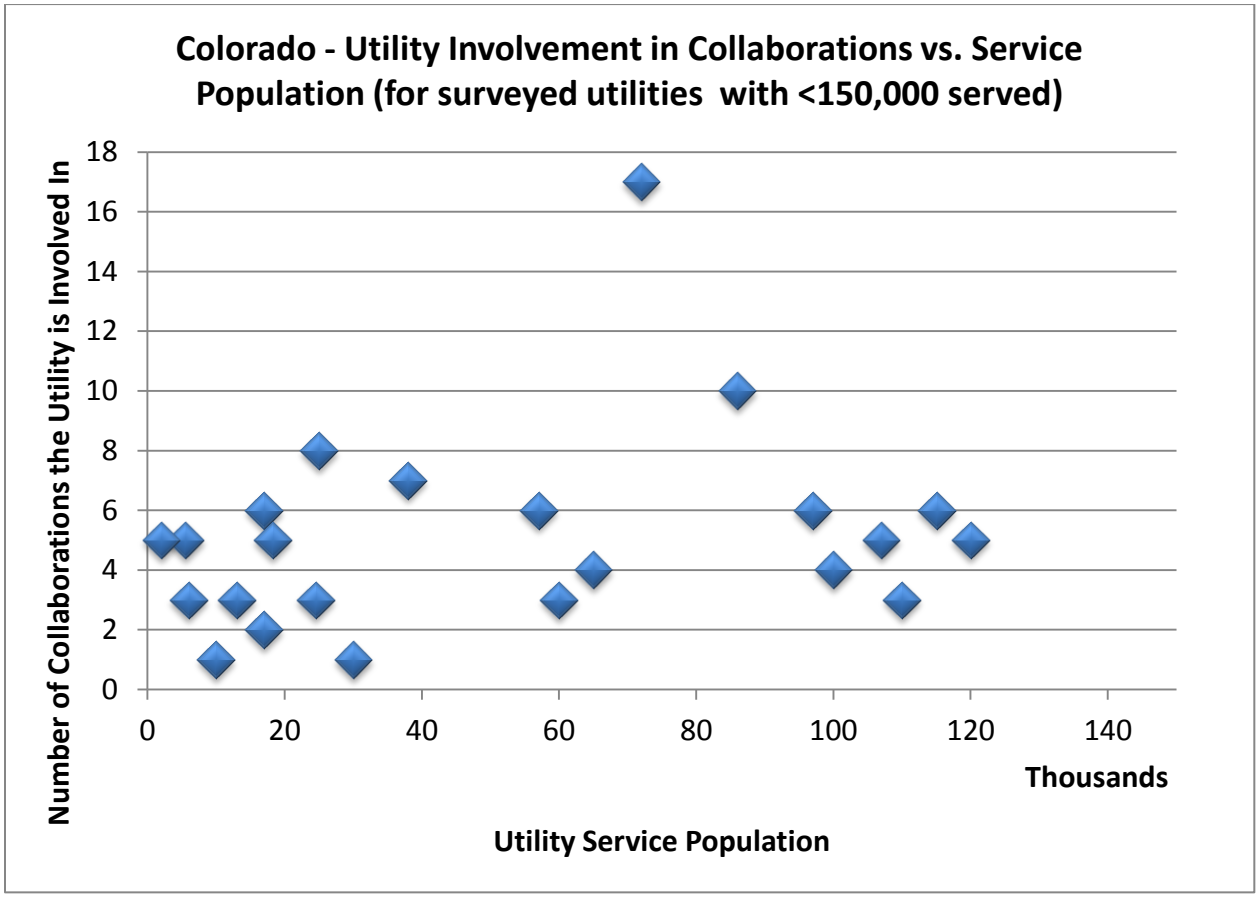

FIGURE 22. COLORADO - UTILITY INVOLVEMENT IN COLLABORATIONS VS. SERVICE POPULATION (INCL. UTILITIES <150K POPULATIONS)

Figure 23 compares the total number of key collaboration areas with the service populations of all utilities surveyed in Colorado. It was expected that utilities with larger service populations would collaborate in more areas, but that was not found to be the case.

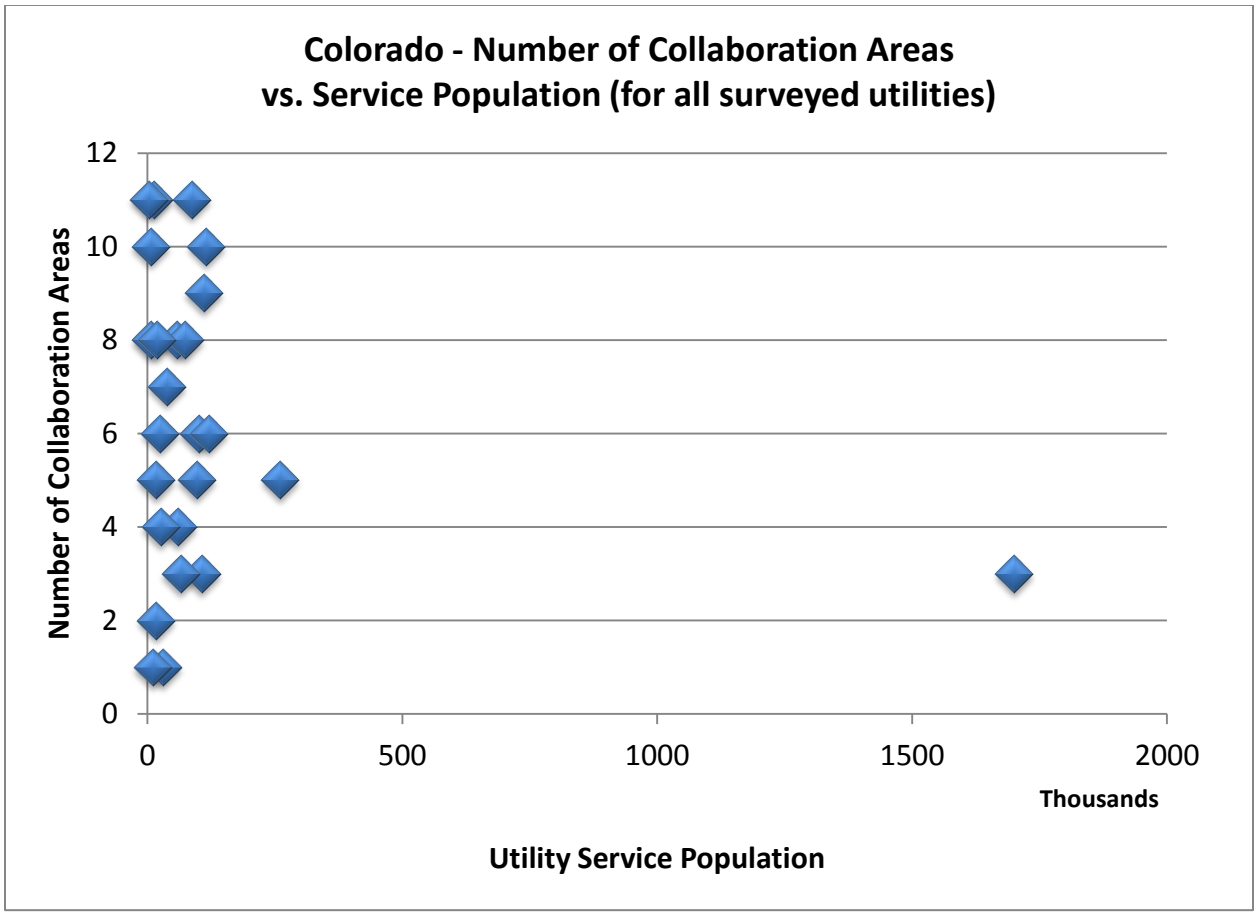

FIGURE 23. COLORADO - NUMBER OF COLLABORATION AREAS VS. SERVICE POPULATION (INCL. ALL UTILITIES)

Figure 24 is similar to Figure 23, comparing the total number of key collaboration areas with the service populations of utilities surveyed in Colorado. However, it only looks at utilities from the Colorado surveys with populations served less than 150,000. There were still no observed trends.

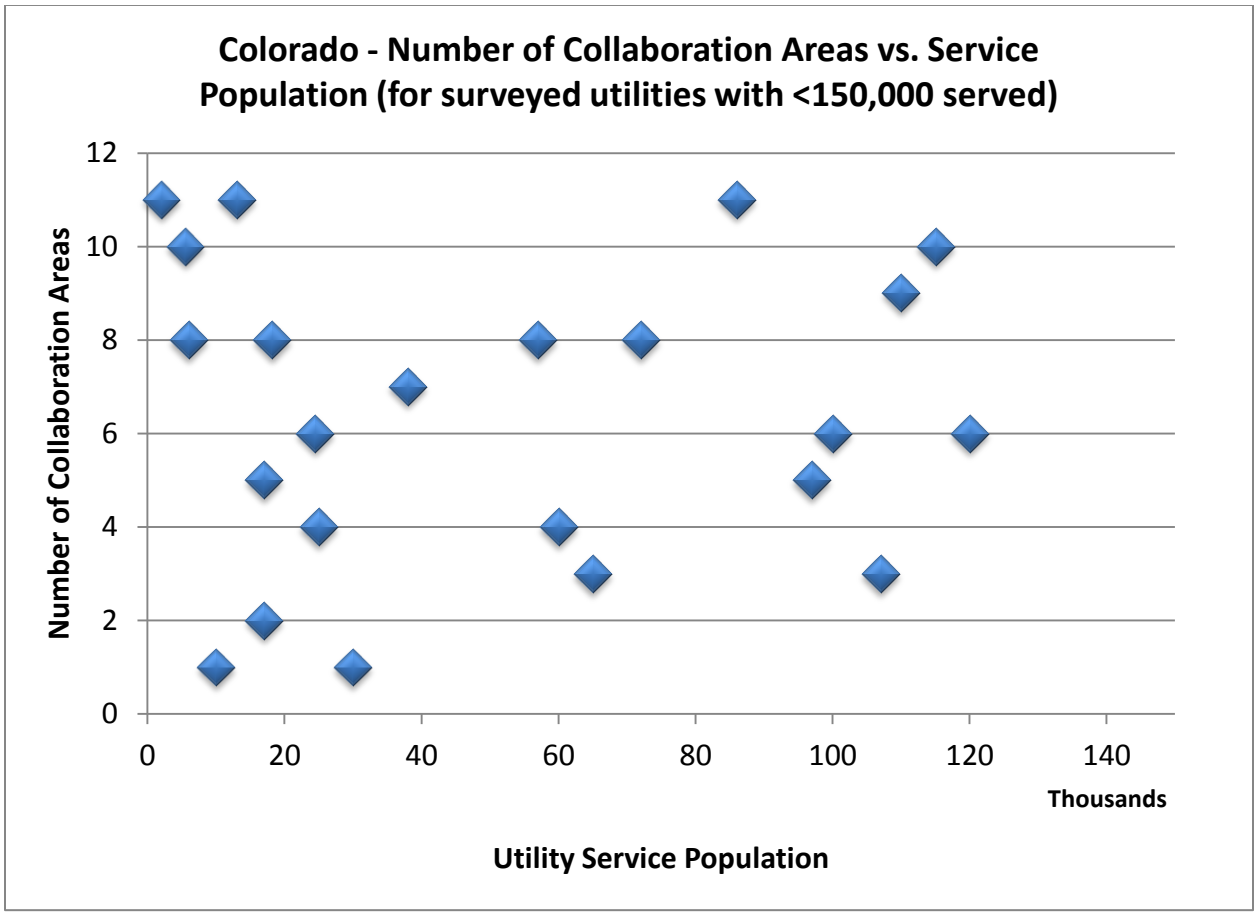

FIGURE 24. COLORADO - NUMBER OF COLLABORATION AREAS VS. SERVICE POPULATION (INCL. UTILITIES <150K POPULATIONS)

Figure 25 compares the number of collaborations that each utility surveyed in Colorado is involved in, with the number of collaboration areas. It was expected that the more collaborations each utility was involved in, the greater the number of collaboration areas they would have. The R^2 value (coefficient of determination) of the linear regression is 0.1433, showing that there may be a slight linear correlation between these values. However, more data would be needed to determine if there is any true statistical significance.

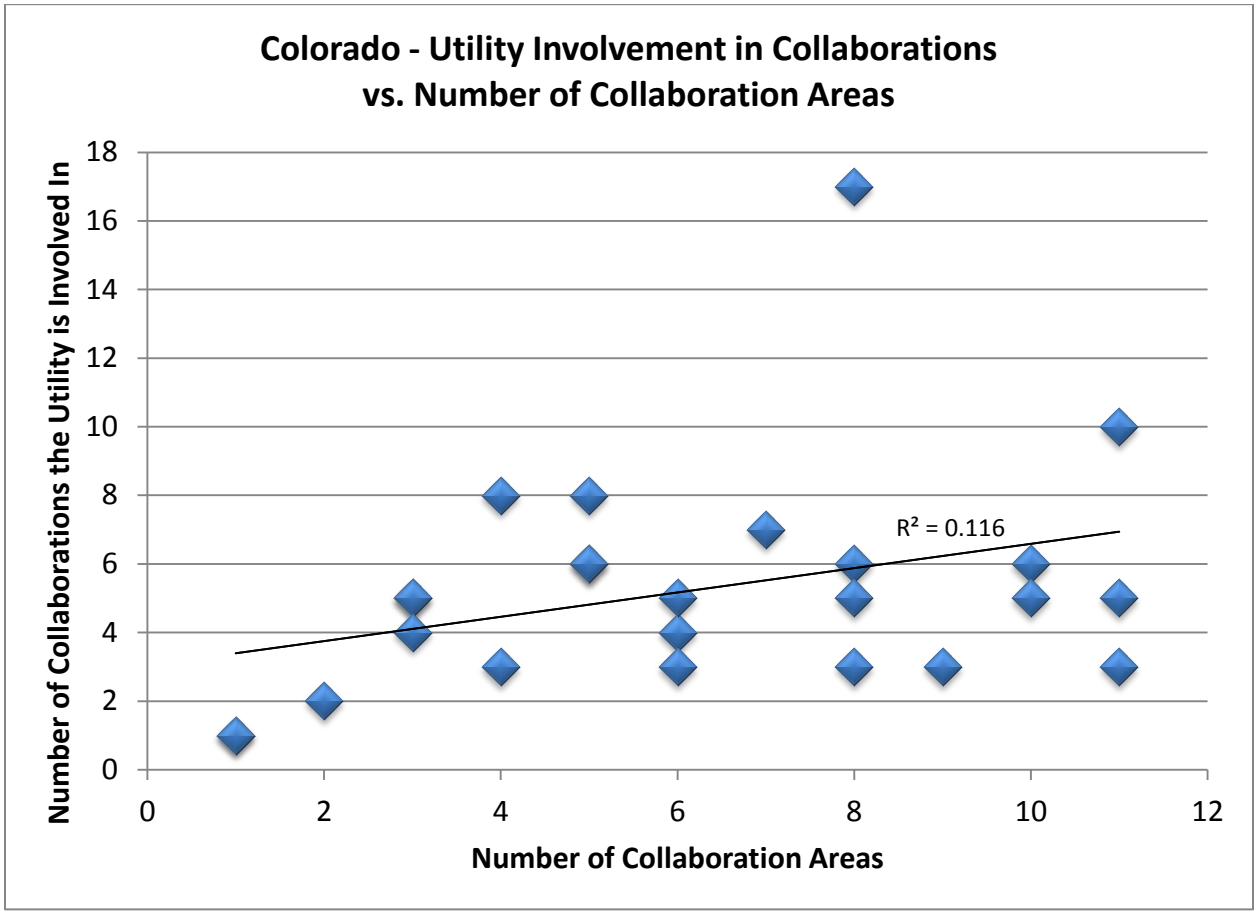

FIGURE 25. COLORADO - UTILITY INVOLVEMENT IN COLLABORATION VS. NUMBER OF COLLABORATION AREAS

SUMMARY

The collaboratives in both studies covered a wide variety of sizes, locations, ages, and member involvement. Although several attempts were made to determine any correlations between these values, none were found.

How Utilities become Involved in Collaborative Arrangements

Research Questions Addressed

5. Clarify how utilities become involved in these collaborations
   a. How do collaborations form?
   b. Do collaborations last and evolve?

One question addressed during the phone interviews in the Colorado study, is how utilities become involved in these collaborative arrangements. Several utilities noted that they became involved in many of these collaborations purely out of necessity, often in response to new or upcoming regulations. Many collaborations are formed when one or more utilities came up with a good idea to address a common issue, and the utilities decided to move forward in a common direction. A few utilities simply stated that they had a collaborative nature so didn't pass up any opportunities. Some utilities became involved in collaborations due to employees that had built relationships over time and were often brought into conversations that led to collaborations, even if they might not be directly related to the individual's job scope. Professional associations or state agencies also provide a good forum for utilities to band together and address common issues. If an issue is important there will sometimes be an email sent out to members that, if interested, can choose to begin a discussion. Depending on the issue, these discussions can lead to the formation of collaborative arrangements. The City of Grand Junction, CO is involved in several collaborations, some that they initiated, others that different cities or associations initiated. There are several routes to forming collaborative arrangements.

AREAS OF COLLABORATION

There were several key activity drivers described by each collaboration in the AWWA National Inventory. The majority of these were grouped into 11 main categories, described in Table 7. These same 11 categories were used to categorize the responses for the key areas of collaboration in the inventory and as checkbox options to select in the Colorado surveys. Each of these areas will be discussed in more detail in the sub-sections below.

Research Questions Addressed

6. Highlight effective areas for regional collaboration
   a. What are the most common topics for collaboration?
   b. Do most collaboratives function on a tight and limited range of activities, or a broader range of activities?

TABLE 7. KEY ACTIVITY DRIVERS/CURRENT ACTIVITIES CATEGORIES

Category	Example
Construct or Purchase Assets/Infrastructure	The construction of a shared pipeline for water resources
Employee Training & Development	Shared training for staff or operators on various issues or regulations
Environmental Assessment	Water quality monitoring
Operational Concerns/Efficiencies	Share best practices
Customer Service and Communications	Public relations; explanations about water service and billing rates
Recreational Needs	Allocating water resource for recreational purposes
Emergency Planning/Response & Security	Security information sharing and planning for emergency scenarios
Technological Research	Research on specific technologies like desalination
Cost Reductions	Saving costs by bulk purchasing of chemicals or other methods of cost reductions
Water Supply Concerns	Allocating and/or managing common water resources
Legislative/Regulatory Issues	Responds to legislative or regulatory issues

Figure 26 shows key drivers from the AWWA National Inventory for forming the collaborative efforts. Each collaboration can have multiple drivers. The median number of drivers listed for each collaborative was two. In contrast, the median number of total current collaboration areas was 4 for the AWWA National Inventory. In fact, 31 of the 45 had more total number of collaboration areas than drivers. This indicates that most collaboratives

likely expanded their collaboration activities beyond those that initially brought the group together. Alternatively, the survey questions were somewhat unclear and elicited different responses to key drivers versus key areas of collaboration. Due to this uncertainty, for the Colorado surveys, the question of drivers was removed. Instead the utilities listed all areas of collaboration. The median number of total collaboration areas was 6 for the Colorado surveys, compared to 4 for the AWWA National Inventory. Figure 27 shows the current key areas of collaboration described by each collaborative in the AWWA National Inventory; each collaboration can work in multiple areas. Due to the potential for confusion in the AWWA study, the key drivers and current key areas of collaboration were combined for each collaborative effort to show all areas of collaboration, as illustrated in Figure 28. Figure 29 shows the same areas of collaboration for the utilities surveyed in Colorado. The breakdown is very similar in both studies. Figure 30 and Figure 31 show the number of collaboration areas each collaboration or utility was involved in for each study. The utilities surveyed in Colorado were generally more involved in multiple areas of collaboration, with many utilities listing 6 or more categories, while the collaborations from the AWWA National Inventory only had 9% involved in 6 or more categories. Figure 33 and Figure 34 show the breakdown of whether utilities or collaborations involved in primarily drinking water, wastewater, or both were involved in each area of collaboration. There were no collaboration topics more common to a particular utility or collaboration focus.

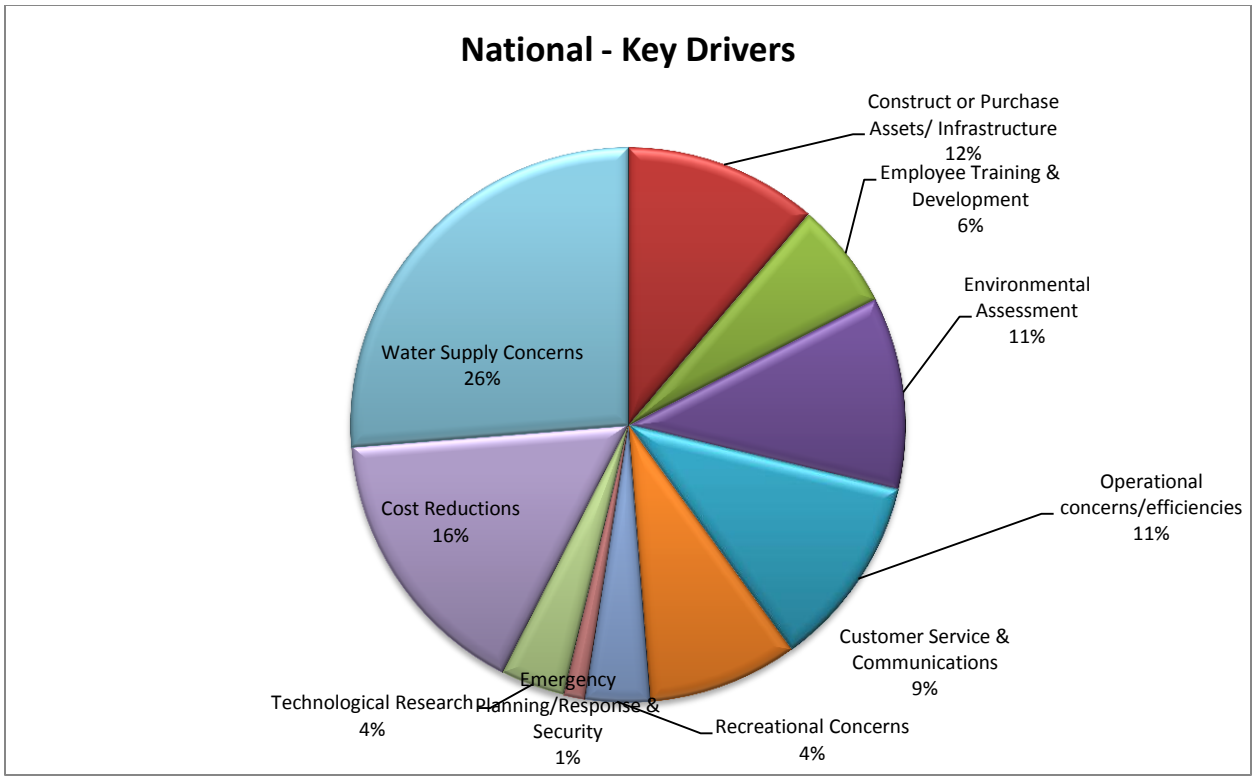

FIGURE 26. NATIONAL - KEY DRIVERS FOR FORMING REGIONAL UTILITY COLLABORATIONS

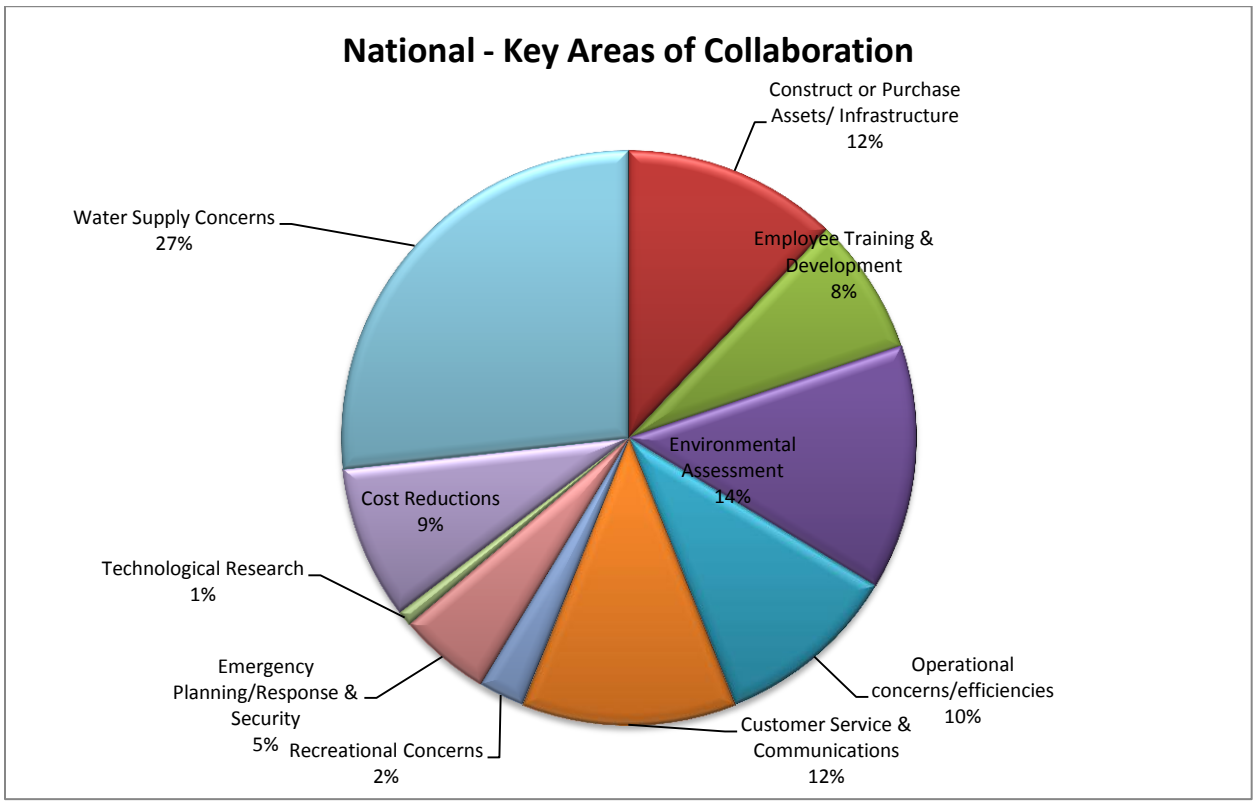

FIGURE 27. NATIONAL - KEY AREAS OF COLLABORATION

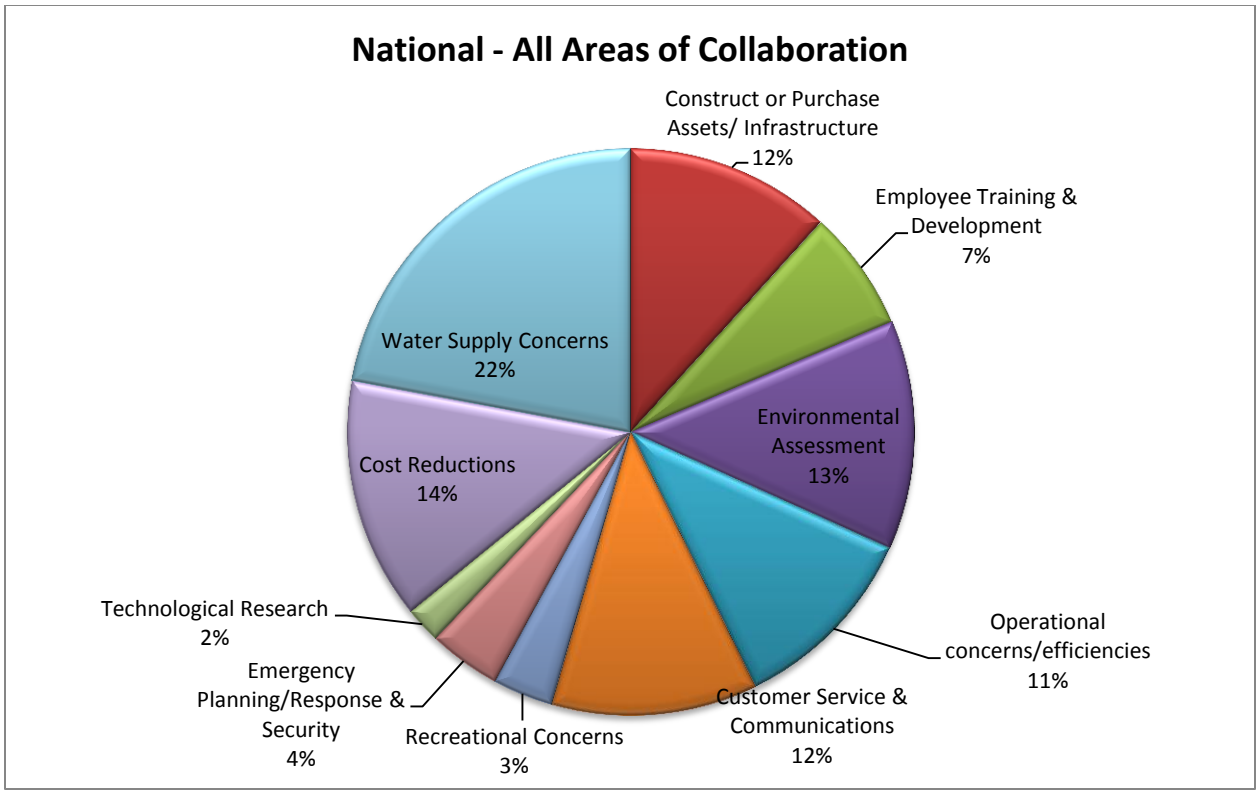

FIGURE 28. NATIONAL - COMBINED DRIVERS & KEY AREAS OF COLLABORATION

FIGURE 29. COLORADO - ALL AREAS OF COLLABORATION

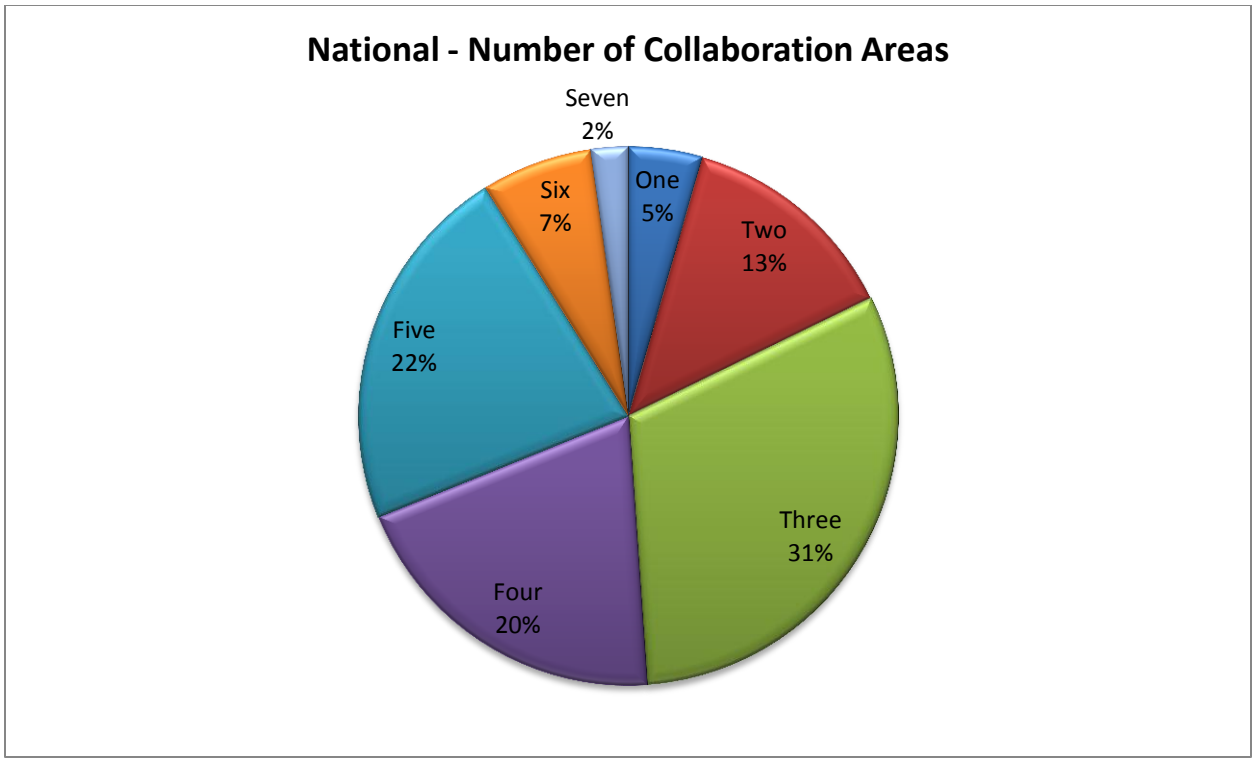

FIGURE 30. NATIONAL - NUMBER OF COLLABORATION AREAS

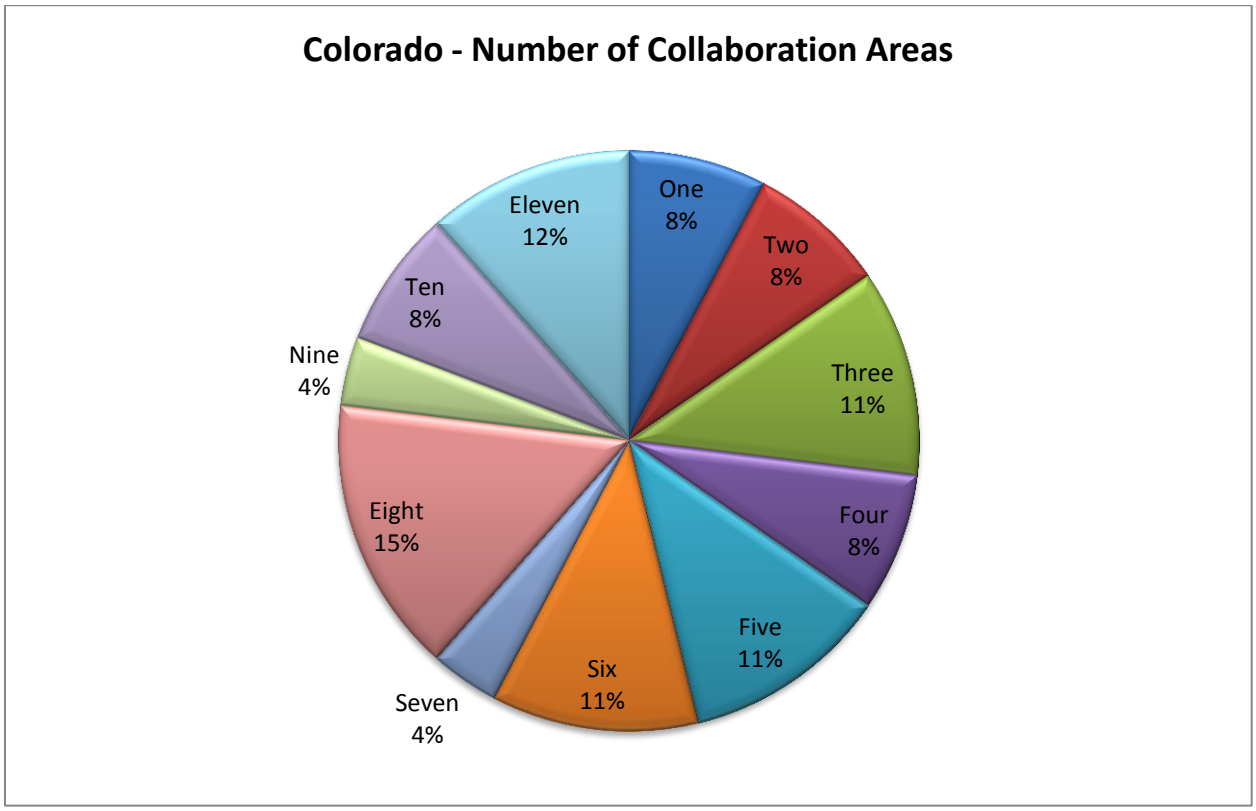

FIGURE 31. COLORADO - NUMBER OF COLLABORATION AREAS

Figure 32 shows the percent of collaborations or utilities that described or listed their involvement in each of the 11 key collaboration areas. The main collaboration areas for utilities surveyed in Colorado were legislative/regulatory issues, operational concerns and efficiencies, and environmental assessment. The least common area of collaboration was for recreational concerns with roughly 25% of utilities involved. The collaborations from the AWWA National Inventory listed water supply concerns, legislative/regulatory issues, and cost reductions as the most common areas of collaboration. The least common area of collaboration was technological research, with roughly 7% of collaborations involved.

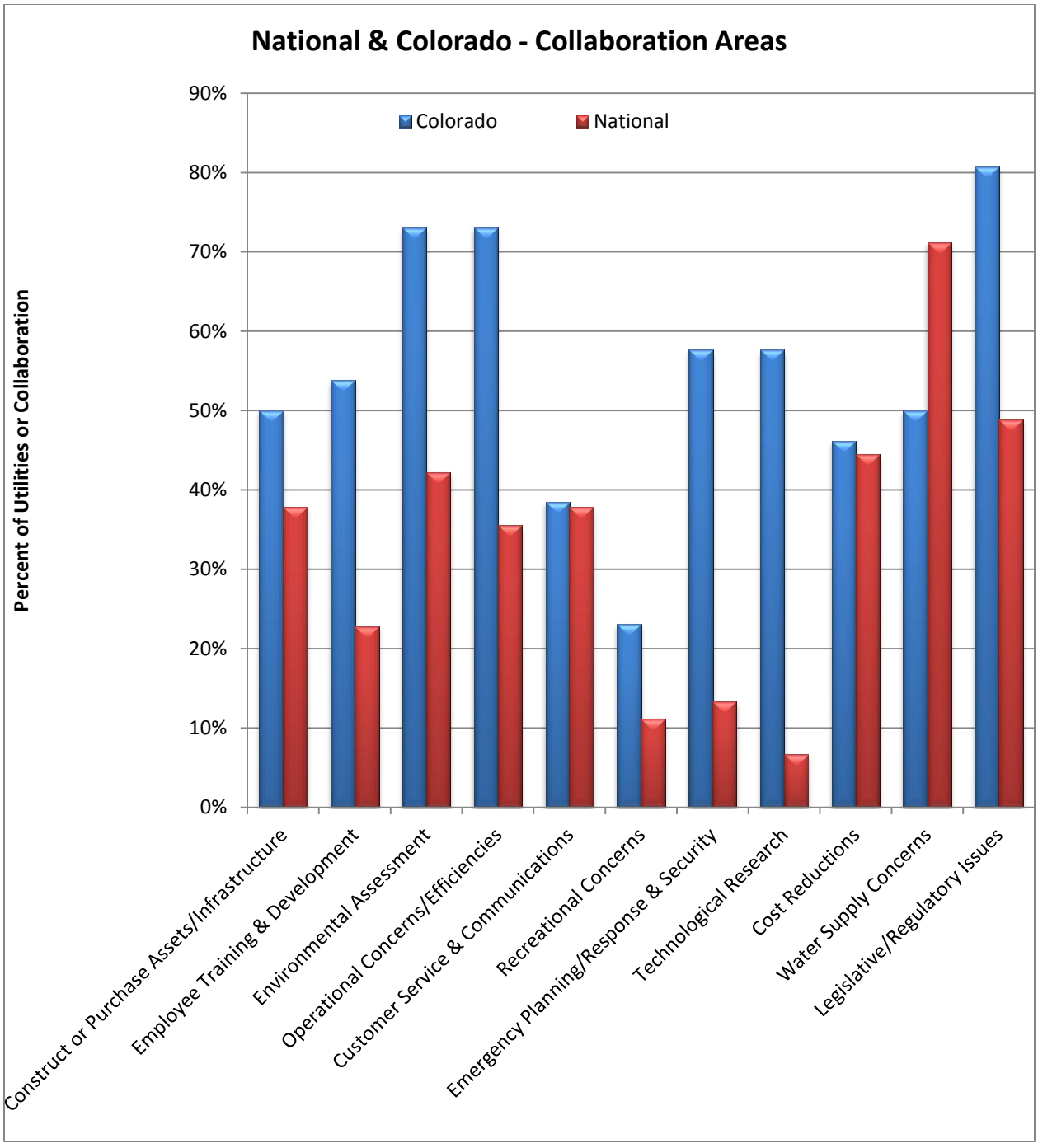

FIGURE 32. COLLABORATION AREAS FROM BOTH STUDIES

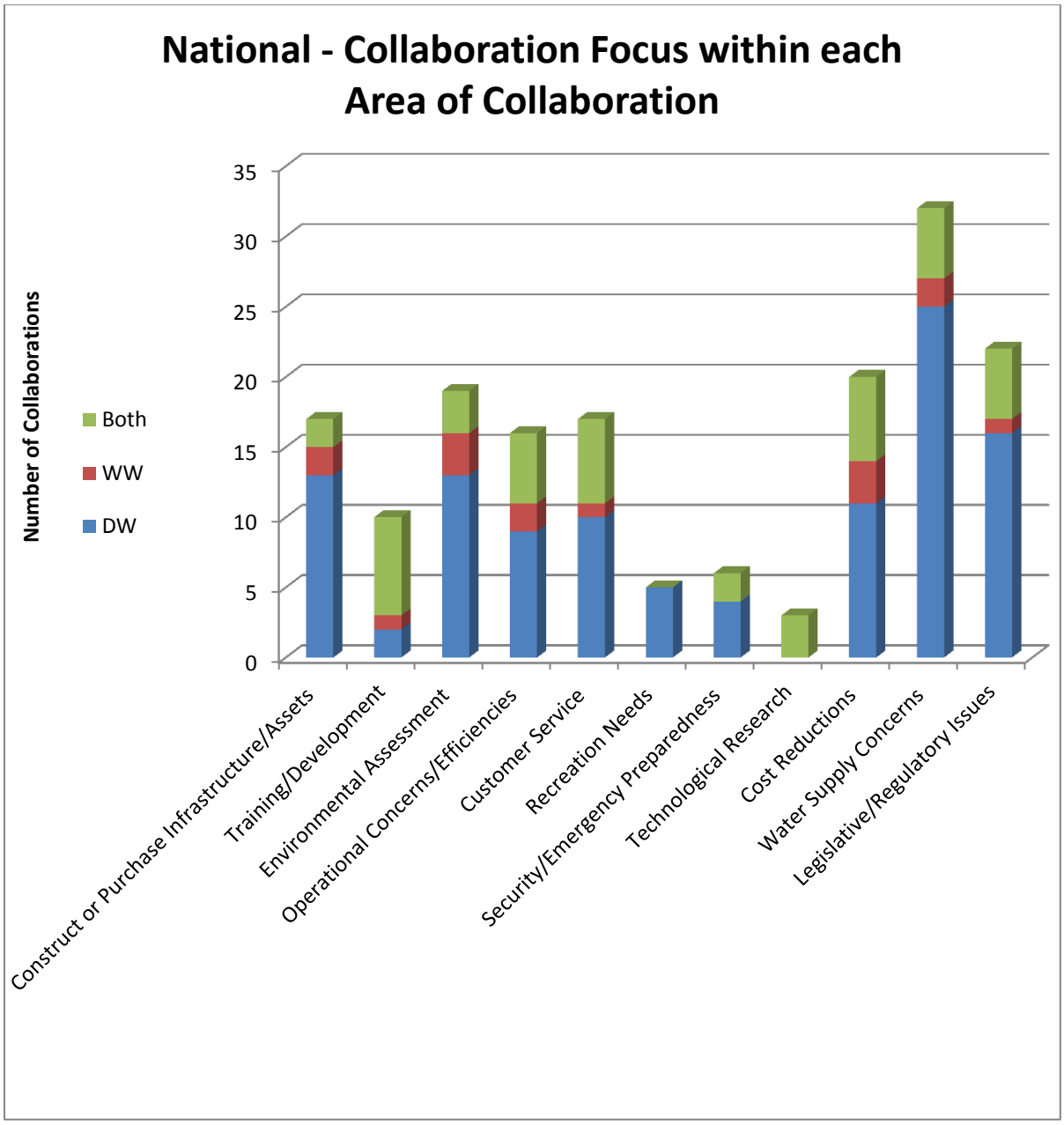

FIGURE 33. NATIONAL - COLLABORATION FOCUS WITHIN EACH AREA OF COLLABORATION

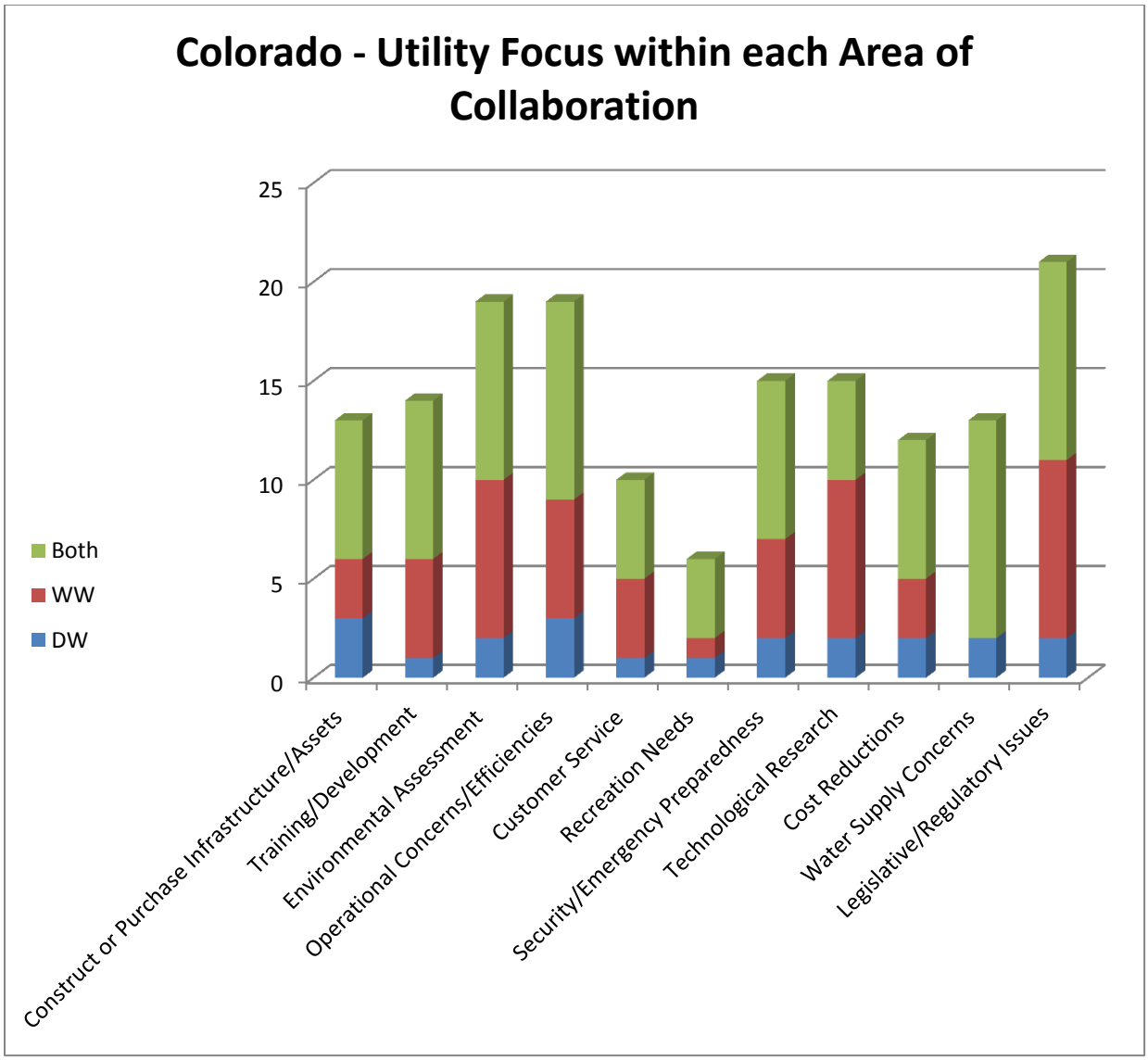

FIGURE 34. COLORADO - UTILITY FOCUS WITHIN EACH AREA OF COLLABORATION

The sections below describe the key areas of collaboration and provide several examples.

Construct or Purchase Assets/Infrastructure

Oftentimes one utility acting along can't meet the needs of their community, whether it's a matter of funding or political concerns. Groups of utilities have frequently banded together to construct or purchase essential infrastructure. This is especially prevalent in regional collaborations in Colorado where sources of water can be very far away and large pipelines are needed for distribution to several communities. Security Water & Sanitation Districts collaborates in the Southern Delivery System. This collaboration is currently in the construction phase, and when completed in 2016 will bring Arkansas River water stored in the Pueblo Reservoir to the cities of Colorado Springs, Fountain, Security and Pueblo West. Another example, the Urban Drainage and Flood Control District, is a regional collaboration formed partly to fund capital flood mitigation projects as a result of water flood events on the South Platte River.

Employee Training & Development

Workforce issues have been recognized as a concern for the past decade. There are a number of converging factors that contribute to workforce concerns in the water and wastewater industry. First, many of the most senior and skilled workers are nearing retirement. This creates a need to both attract new employees and to train these workers. In addition, water and wastewater treatment operations are becoming increasingly complex, requiring the workforce to continuously update its knowledge. These continuing education requirements for operator licenses are not new, but the specific types of educational needs continue to evolve. (Means 2005; Ritchie 2011)

Regional collaboration can address all of these issues. To recruit new workers, utilities can join forces for recruiting. This has occurred via the Bay Area Water/Wastewater Workforce Development Collaborative (BAYWORK), formed in 2009 [see summary in the Literature Review] (San Francisco Public Utilities Commission , 2010). Utilities can also collaborate to provide regional training sessions for employees and share the costs, or pool resources to send a single representative to a key conference or workshop and bring back information to share with the larger group. For example, the Anderson Regional Joint Water System, from the AWWA National

Inventory, coordinates the professional training and development for all 15 member entities. The costs of the training and development sessions are billed per services rendered. This collaboration has provided increased training opportunities for its member entities.

The Regional Training Program by Prince William County Service Authority (PWCSA), from the AWWA National Inventory, was driven by the need to reduce costs and provide more training to more people. Instead of various utilities trying to send people off for training courses everywhere, they realized that by doing it together and establishing a regional training program they could share resources and offer courses for everyone in the region. This has lowered costs and provided more training to more people. PWCSA has stated that it's been a great success for the past 3 or 4 years, especially since it's not anything formal, rather just everybody sharing resources. Funding comes from each utility's training budget on a course by course basis and the training sessions offered are guided by the needs and requests of all utilities.

Environmental Assessment

Environmental assessments span the realm of monitoring and modeling of any or all ecological and water concerns within a watershed. There are several collaborations that work in this area due to the regulatory requirements that come with water and wastewater utility permits. Regional collaborations have developed not only to save individual utilities time and money, but also to provide a venue for information sharing between utilities. This information sharing can add to the amount of data available and improve the quality of monitoring or modeling programs. The South Platte Coalition in Colorado began about 15 years ago when several utilities monitoring the same river segments on the South Platte River decided it would be more cost effective to cooperate. There were even a couple of sampling locations where the joke was that you had to take a number anytime you wanted to sample because there were so many people waiting to sample there. Now each member agency is responsible for 1-2 sampling locations, using the same protocols and analyzing the same parameters, and all of the data is shared in a common database. Another example, the Barr/Milton Watershed Association, is developing a watershed model to assess water quality and try to predict what strategies will be necessary to comply with water quality standards.

OPERATIONAL CONCERNS/EFFICIENCIES

Another key area of collaboration for utilities includes operational efficiency, or doing more with less. Although this has always been a concern, the recent economic situation has increased difficulties for utilities driving new collaborative formation for controlling infrastructure costs, sharing funding for water treatment, storage or transmission facilities, achieving economies of scale, cost control and operational efficiencies. This is particularly timely since water consumption in many areas is flat or declining, reducing traditional revenue streams to utilities. Despite aging facilities and infrastructure, customers are reluctant to see service rates rise, forcing utilities to be more efficient. This can be particularly challenging for small utilities. Therefore, the US EPA (2009) and the Rural Community Assistance Partnership both advocate regionalization or other collaboration approaches for water utilities to gain operational efficiencies (Martin, 2010) (U.S. EPA, 2009). Some successful collaboration examples from the AWWA study are highlighted below.

The City of Hillsboro Joint Water Commission, OR, was driven by the opportunity to share funding of water treatment, storage, and transmission facilities serving the cities. Other drivers that contributed to establishing the collaborative included a new Bureau of Reclamation dam being constructed to store water for municipal purposes and new drinking water regulations on the horizon requiring additional treatment. The City of Hillsboro initiated the collaborative with the City of Forest Grove in 1971, with 3 entities joining since to establish a jointly owned system. Since establishing the jointly owned system, water quality has improved, supply is more reliable, and there have been fewer challenges with regulatory compliance.

The drivers for the Sub-Regional Operating Group (SROG), AZ, as described by the City of Mesa, included a sub-regional approach to controlling infrastructure costs, achieving regional economies of scale and enhancing regional stewardship of the environment. This multi-city collaboration formed an IGA in 1979 and coordinates the wastewater plans of the region, monitors compliance of local governments, enforces state and EPA standards for wastewater in the region, coordinates reuse plans for effluent and residual solids, and coordinates the financial aspects of the SROG program. Overall benefits achieved by the collaborative include area-wide water quality planning, capital investment reduction, and maximizing beneficial use of reclaimed water.

The Val Vista Water Treatment Plant (WTP), AZ, is an IGA established in 1973. It was also fostered by drivers for economies of scale, cost control and operational efficiencies. The Val Vista WTP objectives include cost control and containment, regulatory compliance efficiencies, workable governance structure, achieving the best interests of the citizens for both communities, and identifying synergies for a common water treatment plant. The collaboration has been successful in reducing operating and capital expenditures, incorporating synergies in the operation of the plant, and balancing their approach to the use of limited natural resources.

The Eastern Meter Management Association was established in 1989 to address the concerns of water meter managers and develop solutions to improve each utility's meter maintenance program. The key driver for this collaborative was collective meter and billing practices, and representing the membership to vendors and manufacturers. The benefits of this collaborative include networking, providing a forum for common meter management problems, a source for current and new meter information and a pool of resources and ideas for manufacturers and vendors, as well as utilities, on product performance and industry needs.

Customer Service & Communications

Another common driver in the formation of several collaboratives was to improve customer service and communicate more effectively with the public. This is an important issue since costs have increased in many areas due to the economic situation, water stress factors, and regulatory requirements. Increases in cost are generally coupled with increases in customer concerns and complaints. Improving customer relations can lead to better understanding of costs and better service in general.

The Water Service & Economic Development collaborative, OH, was driven both by the community and the Cleveland Division of Water (CDW). The community drivers included breaks or leak histories in their water mains due to lack of investment for maintenance and neglect of infrastructure, as well as lack of political will for raising finances. Drivers for the Cleveland Division of Water included wanting stability in the customer base, wanting better economic development in the communities, and a desire to maintain a high level of service to the customers. The collaboration has been successful, addressing water main problems and resolving water quality

problems through cleaning and lining. In addition, suburban communities have built a greater trust in CDW, developed a sense of partnership, and seen their dollars at work through tangible results within the community.

The Detroit Water & Sewer Department (DWSD) Technical Advisory Committee (TAC) formed their collaborative due to a need for customer involvement in the development of their 50-year Water Master Plan. This need arose primarily from the customers not feeling real involvement and not understanding the rate model. To some extent, as a result of not understanding the rate model, the customers felt that it was unfair and there were some movements to leave the system. So Detroit said that they wanted to work with the customers on those issues and, after the initial skepticism, developed into the TAC partnering agreement. As a result, there has been enhanced system financial security through the implementation of new contracts, reductions in capital investment through collaboration with customers, improved service, and improved relationships that also translate into reduction in legal disputes.

Recreational Concerns

One of the least common areas of collaboration involves recreational concerns. This involves allocating water for recreational purposes such as rafting. The City of Pueblo Flow Program, in Colorado, collaborated on allowing a rafting course on the main stem of the Arkansas River on a quarter-mile stretch through the center of town, among other issues.

Emergency Planning/Response & Security

Since Sept. 11, 2001, security concerns have become more prominent for water and wastewater utilities. Regulations have required security vulnerability assessments and site security plans. Many security responses coincide with emergency planning. Emergency planning includes response to natural disasters like floods or earthquakes. Ways to meet these challenges can include enhancing physical security, creating infrastructure (i.e. inter-tie pipelines between communities that could be used if a drinking water plant needed to be taken off-line), and better communication and coordination. Utilities can also make plans to share specific equipment in the case of an emergency, which can save money because all utilities are not required to purchase their own equipment. (Copeland and Cody 2007; Grigg 2003)

Coordinating emergency planning and responses among San Francisco Bay Area water utilities was the main driving force behind the formation of BASIC. These utilities met in response to 9/11 and agreed to form BASIC to help coordinate their responses to security issues. Collaboratives that have expanded to address the areas of emergency planning and security issues include the Central Iowa Regional Drinking Water Commission, Shelby/Frankfort Regional Water Management Group (KY), Portland Regional Water Providers Consortium (OR), the Prince William Council of Governments (VA), and the San Juan Water District: Regional Water Authority (CA); four of these five collaboratives existed prior to 9/11.

In the Colorado online survey, 14 out of the 26 utilities listed emergency planning/security among their areas of collaboration. The most prominent example is the CoWARN collaboration, which is intended to bridge the gap between needing immediate aid and waiting for state or federal aid. CoWARN is a coalition of several water and wastewater utilities statewide that have agreed to provide emergency response with people and resources in the event of an emergency. This agency is extremely useful since the members involved know better than anyone else how to run water and wastewater utilities. Several other similar, more local collaborations exist, especially between systems that share connections and have agreed to share water and resources as needed. Eagle River Water & Sanitation Districts is involved in several of these collaborations, including one with the Town of Vail that involves exercises to practice and prepare for emergency situations. Unlike CoWARN, this collaboration is informal, with no signed agreements, but both towns have an understanding to work together and have a common standby emergency response team.

TECHNOLOGICAL RESEARCH

This area of collaboration was more commonly found in the Colorado surveys than in the AWWA National Inventory. Many of the collaborations involved in this area included university participants. The City of Pueblo Wastewater Department has a collaboration with Colorado State University, where the students do research on analytical methods, water quality, and various portions of the treatment process. This research supports the wastewater utility's needs for technological research and provides the students with practical experience and analytical skills.

Cost Reductions

Cost reductions for collaboration member agencies are an underlying theme throughout nearly all of these categories, and several examples have already been provided.

Water Supply Concerns

As water demand steadily increases in many areas from population growth and climate change stresses water supplies, future water supply and source water sharing concerns are proliferating (Levin et al. 2002; Means 2005;Pacific Institute 2009). In some areas the challenge of providing adequate water supply has been a concern for decades and collaborations have been fostered due to these needs. For example, the City of Hillsboro Joint Water Commission (OR), the Upper Occoquan Service Authority (VA), and the Maine: Peace River Manasota Regional Water Supply Authority (FL) have collaboratively dealt with water supply issues since 1971, 1980, and 1982, respectively. Other collaboratives, like the ACF Stakeholders, have recently suffered droughts, prompting collaboration to address these issues. Water supply drivers can range from current and future water supply concerns including source water sharing, recreational needs, exchange rights, surface and groundwater management, and source water quality. Specific examples of regional collaboration driven by water supply and allocation concerns are highlighted below.

The East Valley Water Forum, AZ, was formed in 2003 due to the need for open exploration of regional groundwater management issues. This partnership of tribal, public and private water agencies, and interested stakeholders makes consensus-based decisions regarding water policy issues in the East Salt River Valley. The scope of the collaboration initially included conducting infrastructure mapping to identify facilities and lines, developing groundwater scenarios, developing a regional hydrogeologic model, developing an East Valley Water Resource Management Plan, and then to develop groundwater modeling of drought scenarios based on the previous mapping and modeling results. Recent movement towards appropriate artificial recharge of regional aquifers and using groundwater as a supply of last resort rather than earliest convenience demonstrates the success of this collaborative.

The Lake Erie Water Quality Collaborative is a loose network of plant managers along Lake Erie that collaborate primarily on plant operational issues including lake freeze, taste and odor issues, Lake Erie's dead zones, and the unknown impacts of climate change on the lake's behavior. This collaboration formed informally through Ohio AWWA meetings in the spring of 2007 and has not matured into a formal entity with decision making processes or policy issues. There is simply the verbal understanding that utilities will be proactive about sharing information, with emails at least once per month. This informality has proven to be beneficial to the entities involved, with a better understanding of the 'real time conditions' of Lake Erie, an expanded knowledge base, and better anticipation of conditions so as to better manage plant operations.

The ACF Stakeholders formed due to the 2007 drought in the Southeast and an ongoing law suit regarding the Apalachicola-Chattahoochee-Flint (ACF) River Basin. The lawsuit has been tied up in court for the past 22 years. The group was driven by the need to compromise on a water sharing solution since the states have made little headway, despite a ruling giving Alabama, Georgia, and Florida three years to settle their differences and negotiate an agreement. Therefore, this collaborative includes 77 entities, representing different cities, counties, industries, businesses, fishermen, farmers, conservation, and recreation groups from all three states, who incorporated as a 501(c)(3) nonprofit organization in September 2009. Their objectives include providing leadership in a consensus based basin wide vision and a unified voice for the ACF Basin, implementing solutions that are based on the best available technology and science, and to pursue appropriate change to institutional structure, policies, and procedures in implementing the solutions set forth by this entity.

Each of the entities involved in the City of Pueblo Flow Program, CO, had various water supply and source water sharing related drivers, ranging from recreational to exchange rights, that fostered the need for a collaborative among the Board of Water Works, Southeastern Water Conservancy District, Colorado Springs Utilities, and the Cities of Aurora, Fountain, Colorado Springs and Pueblo . These drivers included: maintaining 100 cfs flow through the City of Pueblo, wanting to construct a new pipeline from the reservoir to the service area, wanting an exchange right to move agricultural water into the reservoir, expanding the reservoir, the desire for an exchange right into the reservoir, and having a rafting course on the main stem of the Arkansas River on a quarter-mile stretch through the center of town. Since six government entities were involved, everyone agreed that an IGA would be necessary.

Since its formation in 2004, this collaborative has successfully addressed the needs of each entity, while creating a better relationship between all parties..

The Standley Lake Cities collaboration, in Colorado, is also driven by concerns for immediate and future water supply needs. These cities are committed to working collaboratively to enhance the sustainability and security of the region's water supply resources through conservation and efficiency, interconnection, and coordinated planning and development of the Clear Creek watershed. Interestingly enough, the formation of this collaboration sparked the formation of another collaboration, the Upper Clear Creek Watershed Association. This second collaboration formed to fight the initial one, since they were concerned that the standards the Standley Lake Cities wanted to adopt for the watershed would force the uphill region to put in additional wastewater treatment that they could afford.

These examples show the range of water supply concerns that can be addressed through regional collaboration. While many of these are formal arrangements, informal collaboration can also provide benefits. The formal structure can help bring together diverse interests to work toward common goals.

LEGISLATIVE/REGULATORY ISSUES

Legislative and regulatory responsiveness is a critical issue for both water and wastewater utilities. Drinking water utilities must respond to new regulations to protect public health, which often include more stringent requirements for contaminants that are already regulated, as well as the regulation of additional contaminants. Wastewater plants face a host of potential new regulations about environmental discharge qualities, including TMDLs and regulations for pharmaceuticals and personal care products. This is becoming increasingly important as more and more research is conducted into the impacts of minute pollutants on our ecosystems and human health. Addressing these regulations can be quite challenging due to the potentially volatile combination of politics, science, engineering and public concerns involved. (Means 2005)

The Director of Utilities Committee as described by the Hampton Roads Planning District Commission arose out of an opportunity to provide a coordinated and coherent position to the Commonwealth of Virginia on the role of all levels of government as it relates to long and short-term planning, resources, operations, regulations, permits, and

water rights. In addition, beginning in the early 2000s, regulatory issues in wastewater drove an expansion of the collaborative. This collaboration has proven cost effective by pooling resources and providing good ideas that help out the entire group, rather than just one or two entities. The group also has a strong influence at the state level on water legislation and regulations, enhancing the effectiveness and speed of state-local communication and feedback.

One of the key drivers for the formation of the Anderson Regional Joint Water System, SC, was to coordinate legislative and regulatory response. The jointly owned and operated water treatment plant creates the foundation for the collaborative, allowing for the collaborative to also cooperate on regulatory issues. The organization was chartered in February 2000, and the system was purchased and began operation in April 2002. Each member agency is financially insulated from non-participating expansion costs.

The Portland Regional Water Providers Consortium, OR, was formed due to concern that the Metro regional government would take over the water planning role. Other drivers included a closing window on municipal water rights being easy to obtain from the state, rapid population growth in the early 1990's, key leadership, and opportunities for more collaboration in the face of increasing federal regulation impacts from the Endangered Species Act, Clean Water Act, and Safe Drinking Water Act. They officially formed in October 1996 under an IGA. Since then, the regional conservation program has gained greater acceptance, helping many members meet State requirements for conservation and management plans to support water rights. They have also built trust between members, allowing the region to speak with one voice on some policy and program matters. Most importantly, they were successful in avoiding a Metro-led water planning effort and have become the go-to entity for collaboration with Metro growth management programs.

The City of Grand Junction, CO water and wastewater utilities are involved in several collaborations working with legislative and regulatory issues. The 521 Drainage Authority is an entity that has 5 member agencies dealing with stormwater regulations. The state of Colorado has passed stormwater regulations that require stormwater monitoring and some water quality testing of stormwater. Complying with these regulations also involves public outreach and communication about stormwater issues, which the 521 Drainage Authority also handles. Other

collaborations that the City of Grand Junction is involved in help to provide a unified voice on the western slope when it comes to water issues.

The mission of the Colorado Wastewater Utility Council, in which 9 of the 26 surveyed utilities in Colorado listed involvement, is to "professionally and responsibly promote environmental protection by supporting legislation and regulations which achieve well-defined environmental benefits while maintaining local flexibility (Colorado Wastewater Utility Council, 2012)." Participation in this collaboration allows utilities to have a voice in Colorado's legislative and regulatory actions, to learn more about the issues, and to hear about these issues as soon as they're being discussed.

SPECTRUM OF GOVERNANCE

Research Questions Addressed

7. Define the types of governance structures for regional collaborations
   a. Are some areas of collaboration better suited to informal governance vs. others better suited to more formal arrangements?

The governance structures of the 45 collaboratives from the AWWA National Inventory ranged from informal to more formal contractual arrangements. Ownership transfer or regionalization which formally creates a new entity that takes over tasks of formerly separate entities were not targeted as participants in the survey. Table 8 from the US EPA describes a range of potential collaboration or partnership arrangements.

TABLE 8. SYSTEM PARTNERSHIP SPECTRUM (U.S. EPA 2002, 2009)

Informal Cooperation	**Contractual Assistance**	**Joint Powers Agencies (JPA)**	**Ownership Transfer**
→ → → Increasing Transfer of Responsibility → → →			
Coordinate with other systems, but without contractual obligations	Utilities contract with another system or service provider, but contract is under the system's control	Creation of a new entity designed to serve the systems that form it	Takeover by an existing entity or a newly created entity (regionalization)
Examples:			
• Sharing equipment • Sharing bulk supply purchases • Mutual aid arrangements	• O&M • Engineering • Purchasing water	• Sharing system management • Shared operators • Shared source water	• Acquisition and physical interconnection • Acquisition and satellite management • Transfer of privately-owned system to new or existing public entity

The majority of collaboratives were classified as contractual assistance, with the spectrum of governance structures shown in Figure 35. At the time the AWWA National Inventory was conducted one collaborative hadn't

finalized a governance structure. The same spectrum of governance structures was provided as checkboxes for the Colorado online surveys, as shown in Figure **36**. The most significant difference between the two studies is the greater proportion of IGA-structured collaborations in the Colorado study compared to the AWWA National Inventory. This could indicate that utilities prefer collaborations that are governed either informally or by an IGA, probably because of the familiarity with IGA-based structures due to their municipal nature.

Although the governance structures for collaborations in the Colorado surveys were identified, they were not discussed in-depth as they were in the AWWA National Inventory. Several examples of informal and formal collaborations from the AWWA study are discussed below.

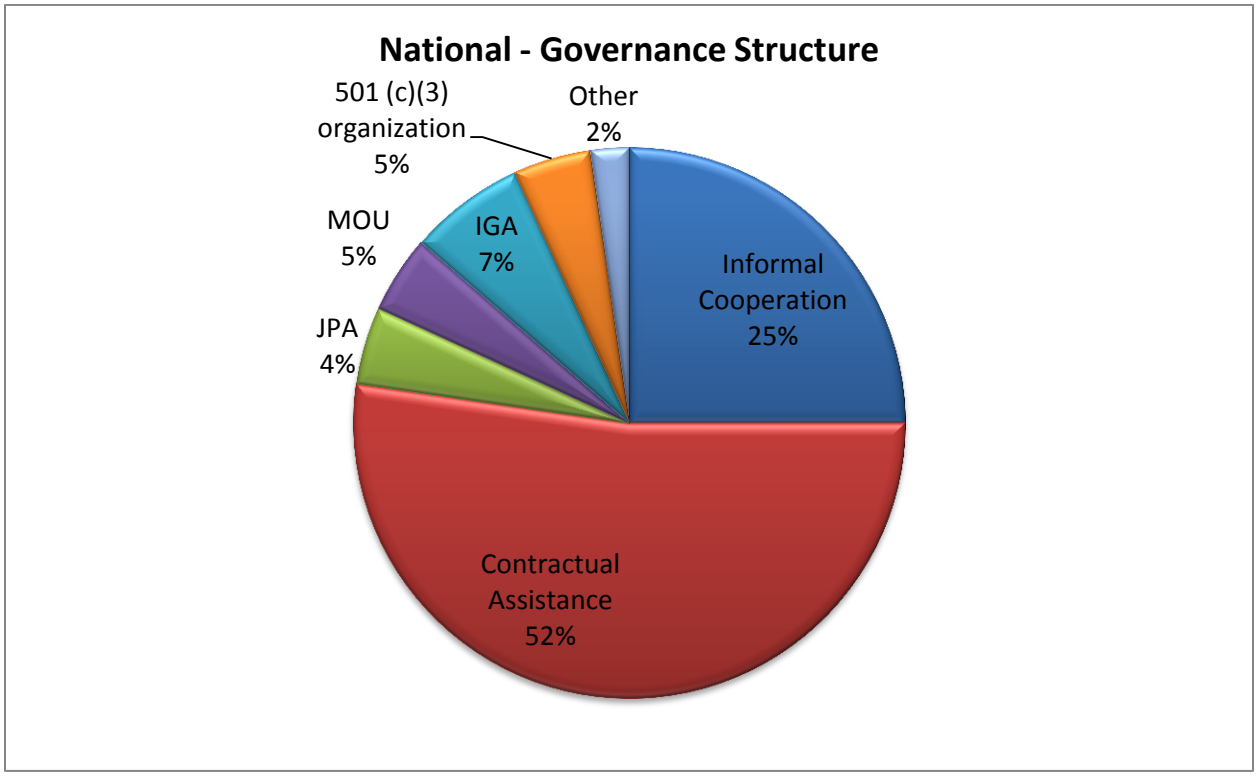

FIGURE 35. NATIONAL - GOVERNANCE STRUCTURE

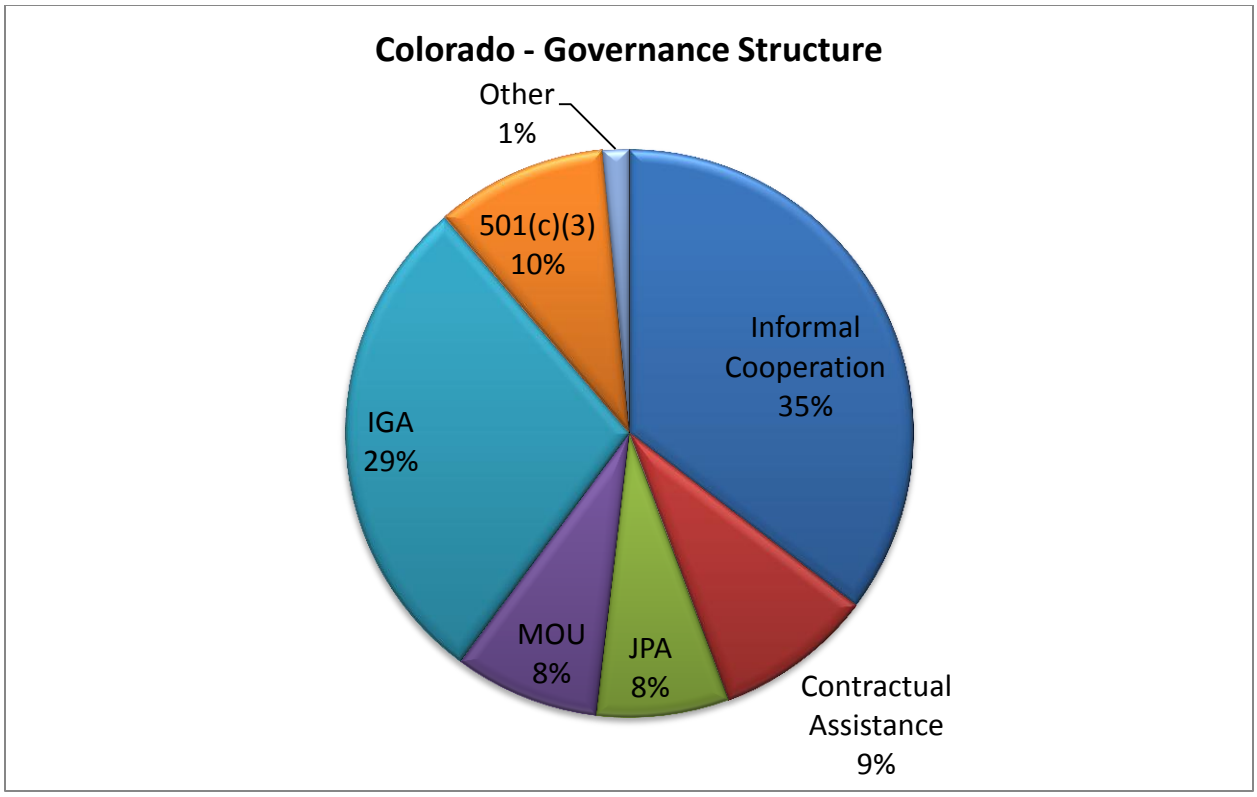

FIGURE 36**. COLORADO - GOVERNANCE STRUCTURES**

Some governance structures are more common for some types of collaboration, with results from the AWWA National Inventory summarized in Figure 37. Contractual assistance was represented among all areas of collaboration, while informal collaboration was represented among 9 of the 11 collaboration areas; IGAs spanned 10 areas, JPAs spanned only 6 areas, 501(c)(3) 6 areas, and MOUs 3 areas. Some collaboration areas are "richer" in a particular governance structure compared to the overall average of the collaboratives (from Figure 17). Contractual assistance governance was over-represented in collaboratives involving new regulations. Informal cooperation is more common for cooperation on training/development issues. Intergovernmental Agreements (IGA) were over-represented among collaborations for new regulations, security/emergency preparedness, and recreation need. Joint powers authority (JPA) was rare overall; of all collaboration areas it was most common among the security/emergency preparedness collaboratives. Similarly, MOUs were primarily found in the training/development collaboratives.

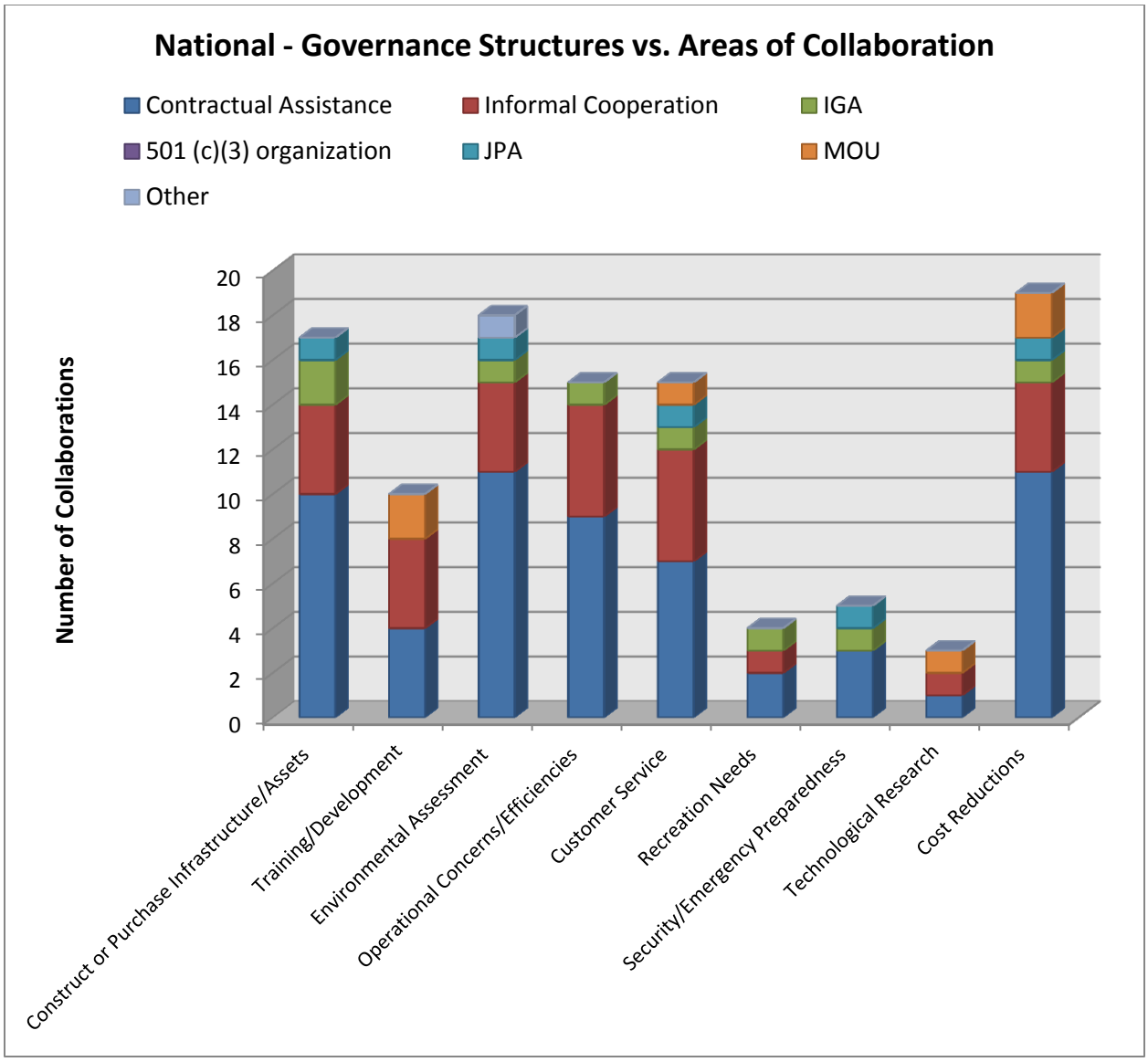

FIGURE 37. NATIONAL - GOVERNANCE STRUCTURES VS. AREAS OF COLLABORATION

INFORMAL COLLABORATION

Informal collaborations involve utilities and entities meeting together to share information and work together without any formally binding arrangements. Several of the collaboratives interviewed have an informal governance structure.

The Lake Erie Water Quality Collaborative remains a loose network of utilities that share information, with no real decision making process or policy issues, but as previously mentioned, this informal structure is one of the benefits

of the collaboration. There is simply the verbal understanding that utilities will be proactive about sharing information, with emails at least once per month and since the spring of 2007. This collaborative has provided better understanding of the 'real time conditions' of Lake Erie, expanded knowledge base, and better anticipation of conditions so as to better manage plant operations.

The LADWP Multi-Agency Benchmarking Program was very informal, where everyone had a website or common platform that everyone had access to and would input projects with various costs and evaluation in order to compare and contrast to the other projects to determine common elements as far as design or construction management costs. The group would informally meet together to come up with some best management practices on various areas of planning and cost estimating. This collaborative ended in 2010 once funding, sharing of projects and sharing of lessons learned ran its course.

The Arizona Customer Service Professionals in the Town of Gilbert also have a very informal collaborative where leaders from Gilbert, Tempe and Scottsdale coordinate the meetings between 23 entities. The group has been meeting since 2007. Any participant can submit a topic for discussion, all participants have equal say regardless of size, and minutes are issued by one of the participants. The only policy issues discussed during the formation of the collaborative was the need to adhere to utility-specific policies about vendors paying for donuts & coffee. This collaboration has seen improved sharing of information and ideas, team building, coordination and consistency of local policies, smaller utilities have benefited from the scale of larger utilities, improved efficiency especially with regards to training opportunities and conferences, and even sometimes collaborating on commodity and shared purchases. Keeping the collaborative informal has worked for the group by allowing all participants to raise ideas and issues, keeping the collaborative relevant and participants engaged. In addition, the group receives a huge payback in terms of these benefits for a relatively small investment of time and money.

Groups with common interests may want to consider initially meeting together informally and building trust, prior to evolving to a more formal structure. One collaborative characterized informal collaboration as easy to start, but also easy to dissolve without the right leadership. Informal collaboration was listed as a potential governance model explored by other collaboratives in the study, including the East Valley Water Forum, AZ. The Sub Regional

Operating Group (SROG) with the City of Mesa, AZ, and others, stated that they considered informal collaboration without an IGA, but members feared loss of control and cost recovery.

Formal Collaboration

A wide array of types of formal collaborations among water and/or wastewater utilities was seen in the AWWA study. The majority of these collaborations were contractual assistance or inter-governmental agencies (IGA). The majority of these collaborations were driven by the need for improved drinking water quality and/or supply.

The BACWA collaborative's governance structure is based on a JPA. The JPA is represented by members from the 54 participating agencies and supplemented, as needed, with consultant support. The five largest water pollution control agencies in the San Francisco Bay Area are the signatory members. The JPA is governed by a five-member Executive Board, with an Executive Director and several technical committees. The Board meets monthly to consider recommendations from committees, manage the activities of BACWA and approve all expenditures. BACWA's JPA states that if one of the signatory members withdraws, the JPA will dissolve, thereby incentivizing the Board members to work together.

Another formal collaborative is the Prince William County Service Authority (PWCSA) Regional Training program, previously discussed in section 5, which is organized by PWCSA and governed through memoranda of understanding (MOUs) that everyone signed including 6 larger entities and several smaller cities. They stress that it's not a formal bureaucracy and that everyone is just sharing their resources. After the initial startup and organization for sending out information, it has been basically running on its own.

The City of Pueblo Flow Program formed an intergovernmental agreement (IGA) since there were six government entities involved. They also utilize a recovery of yield (ROY) committee with a technical representative from each government entity to keep track of the exchanges and discuss downstream storage as needed. Negotiations on the IGA were handled by the utility administrators and their technical representatives. Attorneys were not involved in the negotiations; they drafted the agreement after the administrators and technical folks reached a consensus, which was part of the key factors leading to the success of the collaborative. Having an IGA not only created a better working relationship between the six parties involved, but keeps all parties engaged on an ongoing basis,

and at times is even used as an educational tool to inform individuals or groups about the value of the agreement and the services it provides to the six organizations. The ROY committee continues to meet almost quarterly to make sure that the downstream storage is ready for operation each year.

The Val Vista Water Treatment Plant was founded in 1973 and is a collaboration between the smaller City of Mesa (interviewed) and the City of Phoenix, AZ. They decided on an IGA governance structure and did not evaluate other alternatives, stating that an IGA is the best approach to forming a collaborative between cities. They conduct quarterly meetings to review operational and financial issues, with separate meetings held as necessary to discuss and resolve any outstanding issues. Critical factors to success were stated to be a defined agreement that is workable and understood by the parties, the periodic meetings, and open communication channels to discuss and share information. Challenges have included financial constraints, and the effect of increased growth or lack of growth by one or more parties and its effects on operational and financial positions. Benefits achieved through collaboration were stated to be reduced operating and capital expenditures, synergies incorporated into the operation of the plant, and a balanced approach to the use of limited resources.

The ACF Stakeholders were incorporated as a 501(c)(3) nonprofit organization in September of 2009. The collaborative has an 8-member Executive Committee with 2 members from each sub-basin (Upper Chattahoochee, Flint, Lower/Middle Chattahoochee, and Apalachicola) selected by Governing Board members. There are 56 members on the Governing Board, representing 14 different stakeholder Interest Caucuses. The specific decision making process that the ACF Stakeholders consciously chose to incorporate into their governance structure represents a consensus view of the membership. Thus, every member of the Governing Board must accept or 'live with' each decision or recommendation made by the group in order to have a stronger impact when taking a position on an issue.

BASIC represents another approach to formal collaboration, organized via contractual assistance. BASIC (the Bay Area Security Information Collaborative) is the group of 9 entities formed to address security concerns in 2001, shortly after 9/11. Once BASIC realized that they were going to officially form a group, they developed a simple charter article that included membership, meeting frequency, size of agencies invited to participate, joint financing

associated with projects, and improvements they wanted to address. Beyond that they saw no reason to evaluate alternate governance structures and still don't. BASIC has provided its members the ability to compare and contrast security practices and strengthen their water security programs. The collaborative has developed threat response procedures with lists of options. They also conducted a tabletop exercise in conjunction with the FBI, California state and local public health agencies, other public water agencies, HazMat agencies, and fire and police departments to address a potential intentional contamination of pipelines throughout the Bay Area.

MANAGEMENT

This section addresses several management concerns of collaboratives, including collaborative services, establishing sustainable and growing collaborations, and successful financial management strategies. All of the data for these sections came from either the Phase 2 interviews of the AWWA National Inventory or the Colorado survey follow-up phone interviews.

Research Questions Addressed

8. Define management structures for most regional collaborations.
   a. What financial management structures are common for regional collaborations?
   b. Do these vary by collaboration goal (i.e. emergency response vs. legislative issues)

COLLABORATIVE SERVICES

In some cases, a collaborative will offer particular services to its members. These were generally listed as specific operational and/or business responsibilities of the collaborative. Informal collaborations typically did not list any of these responsibilities, beyond providing a forum to share ideas and facilitating the exchange of information. When the collaborative owned treatment utilities, it was responsible to ensure effective management of the facility in compliance with applicable rules and regulations. Other responsibilities included coordinating meeting logistics, disseminating information to all parties of the collaborative (such as policies decided by the governing board), administering joint purchasing/bidding, maintaining operation of the website and communicating with the public regarding water conservation, rates, etc. The collaboratives may also coordinate studies and technology evaluations of interest to the group. Some examples of the service areas provided by collaboratives to their members are highlighted below.

The Bay Area Clean Water Agencies (BACWA), from the AWWA National Inventory, is primarily focused on technical issues and its members collaborate through several technical committees. These committees address issues related to air quality and regulations, Bay Area pollution prevention, biosolids, collection systems, laboratory analytical methods and protocols, permits, and water recycling. BACWA also has three information-sharing groups related to Bay Area maintenance, engineering, and operations information.

The Catawba-Wateree Water Management Group (WMG), also from the AWWA National Inventory, collaborates in areas regarding water supply, drought response and public education about water issues. The WMG funds and

manages projects and studies that will either directly or indirectly increase the usefulness of the Catawba system for human purposes while maintaining the ecological integrity. The WMG's five year strategic operating plan has annual goals and objectives, tracking progress on the completion of these goals is the current metric.

The Ute Water Conservancy collaboration with the City of Grand Junction utilties, from the Colorado surveys, is fundamentally focused on water and the regional conservation plan developed between the cities of Grand Junction, Ute, and Clifton. Outside of this scope, the collaborative also has a cooperative plan where they work together to do total retrofits, landscape audits, run an annual children's water festival each May for 5th graders to do educational activities, as well as information sharing on a variety of utility concerns.

SUSTAINABLE AND GROWING COLLABORATIONS

A key indicator of successful management of a collaborative is whether or not it is sustainable and/or growing. Collaboratives that are sustainable have proven able to last for a long time without damaging relationships or creating additional issues. About 30% of the collaboratives from the AWWA National Inventory and 63% of the collaborations from the Colorado survey have been working together for 11 or more years, indicating sustained activity. Growing collaboratives have demonstrated an ability to work beyond the initial driver that brought collaborating entities together. Several examples are described below. Of the 45 collaboratives who participated in the AWWA study, 69% listed more areas of current collaboration than initial drivers.

BACWA is an excellent example of a growing collaboration, having begun to work primarily on Bay Area Pollution issues and grew into several technical and information sharing groups that still look at Bay Area Pollution, but have expanded their range. BACWA has benefited through better coordination on regulatory and policy issues, sharing funds and resources to conduct more expensive technical studies, and establishing shared information between more than 100 wastewater agencies in the Bay Area.

One of the oldest collaboratives interviewed is the City of Hillsboro Joint Water Commission (JWC), formed in 1971. The City of Hillsboro JWC collaborates in areas of water treatment, storage, transmission, conservation and quality. Management responsibilities of all matters related to the jointly owned system are assigned to one of the

partner agencies, and in this case have been continuously provided by the city of Hillsboro. The collaborative has benefited through higher water quality, more reliable supply and regulatory compliance.

The Val Vista WTP formed in 1973 and the cities involved are responsible for the construction, operation and maintenance of the water filtration facilities and to make common use of the plant and transmission line. All of the assets and infrastructure for the plant and transmission line are shared by the collaborative in accordance with the IGA. In addition, any support services such as accounting or management are also shared by the collaborative. Thus the collaborative has successfully reduced operating and capital expenditures, incorporated synergies into the operation of the plant, and balanced approaches towards using limited resources.

Financial Management

The financial approaches for each collaboration were categorized between: pro rata, membership dues, none, per event, costs equally shared, participation based, in-kind services, or external funding depending on the survey responses. Each collaboration could have multiple financial approaches, for example there are several Colorado utilities that use both membership fees and in-kind services. Figure 38 shows the breakdown of financial management structures for each AWWA National Inventory collaboration and Figure 39 shows the collaborations surveyed in the Colorado study. The most common financial arrangements are membership dues, pro rata or per event. For Colorado utilities there was also a large percentage that have external funding sources from grants or leveed taxes.

Comparing financial management strategies per governance structure of collaboratives for both studies shows no particular trends (Figure 38 and Figure 39). Further discussion of these financial approaches and some specific examples are provided below.

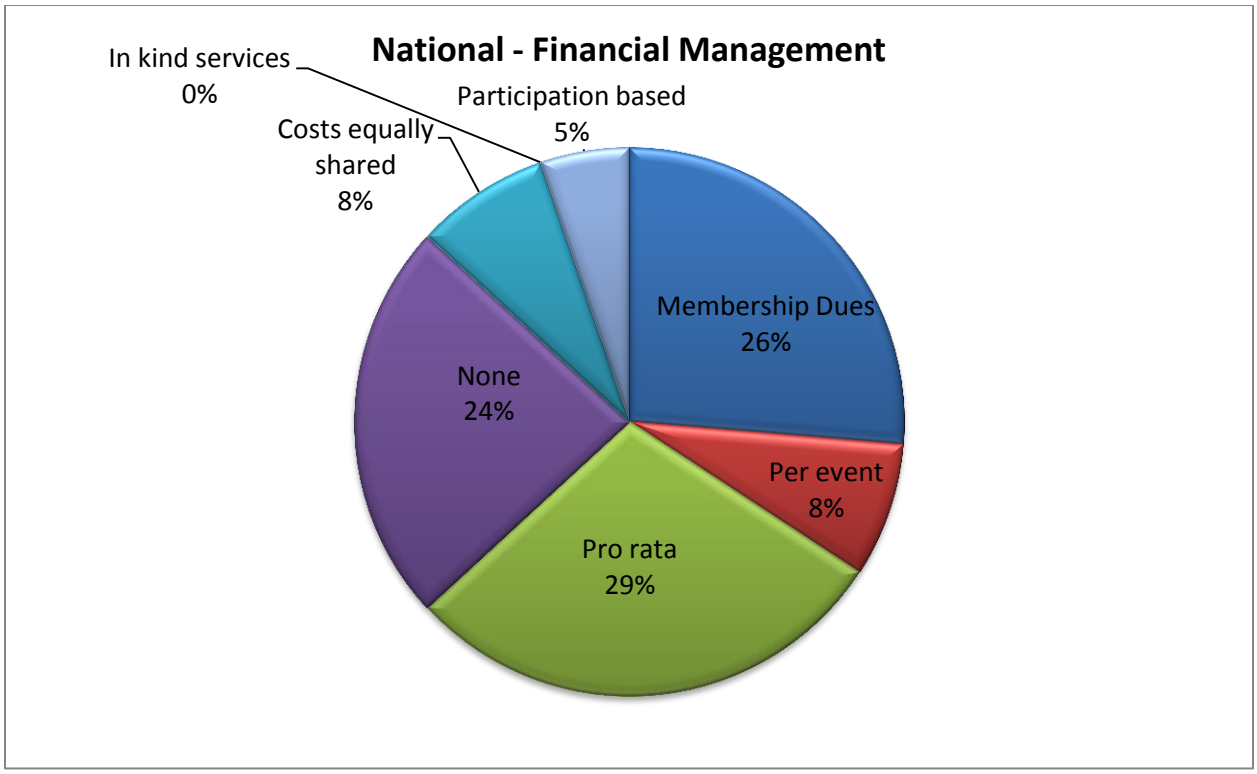

FIGURE 38. NATIONAL - FINANCIAL MANAGEMENT

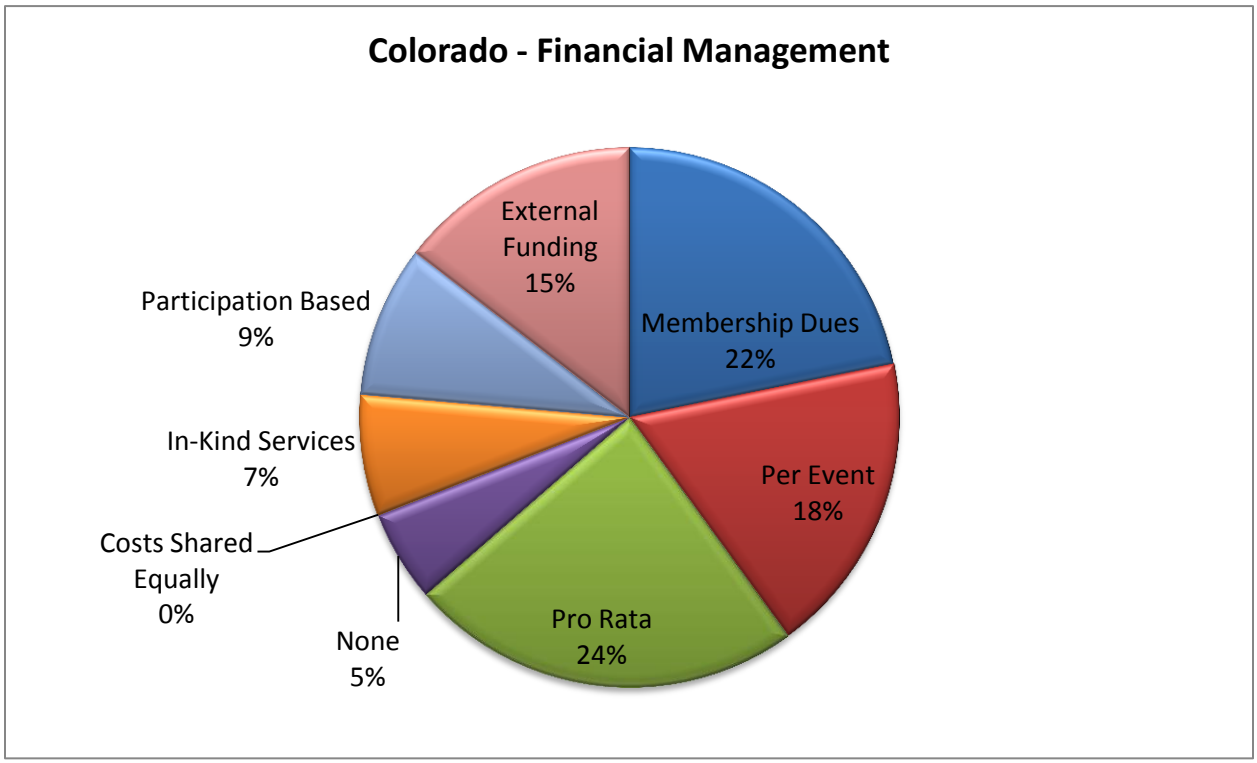

FIGURE 39. COLORADO - FINANCIAL MANAGEMENT

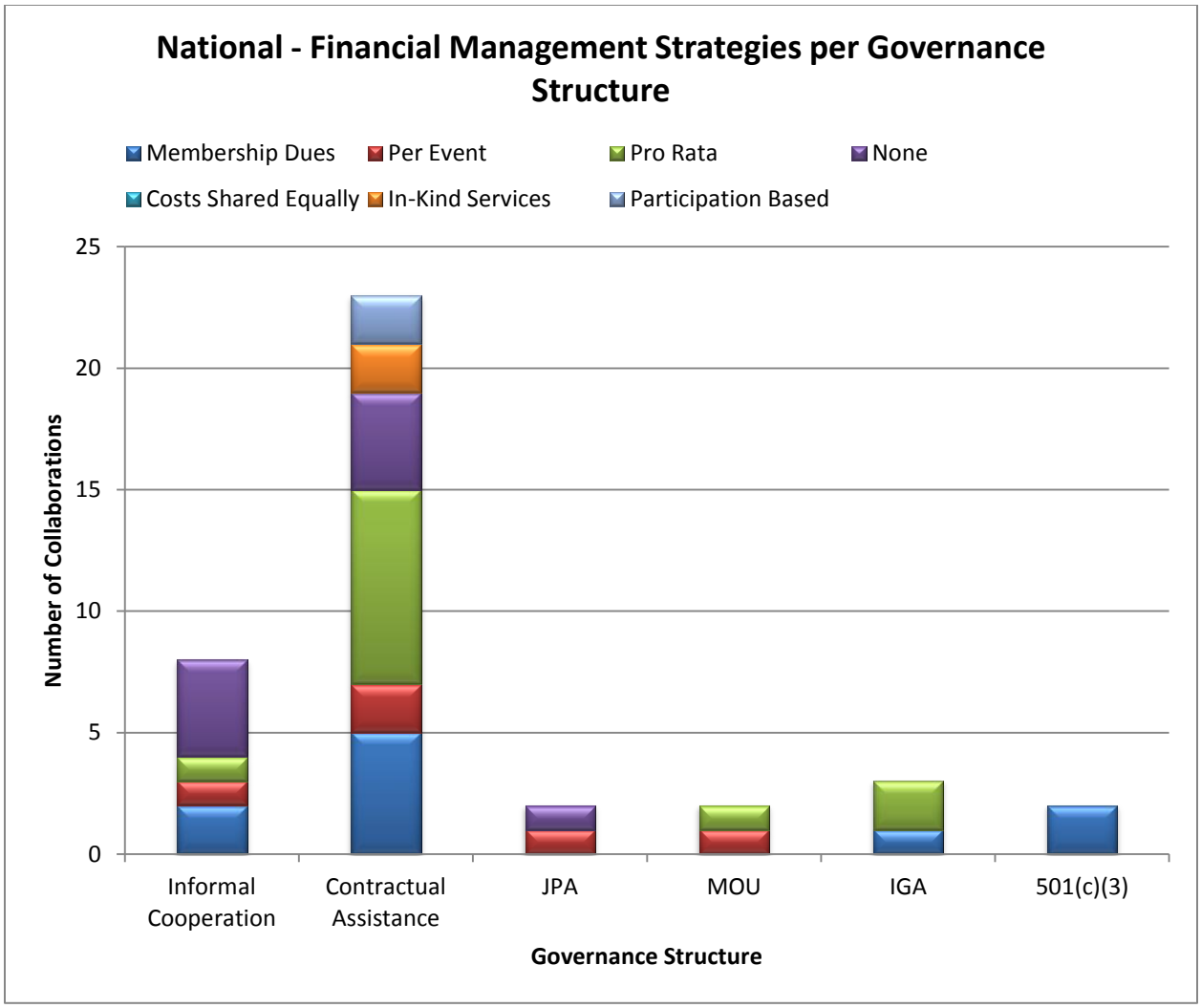

FIGURE 40. NATIONAL - FINANCIAL MANAGEMENT STRATEGIES PER GOVERNANCE STRUCTURE

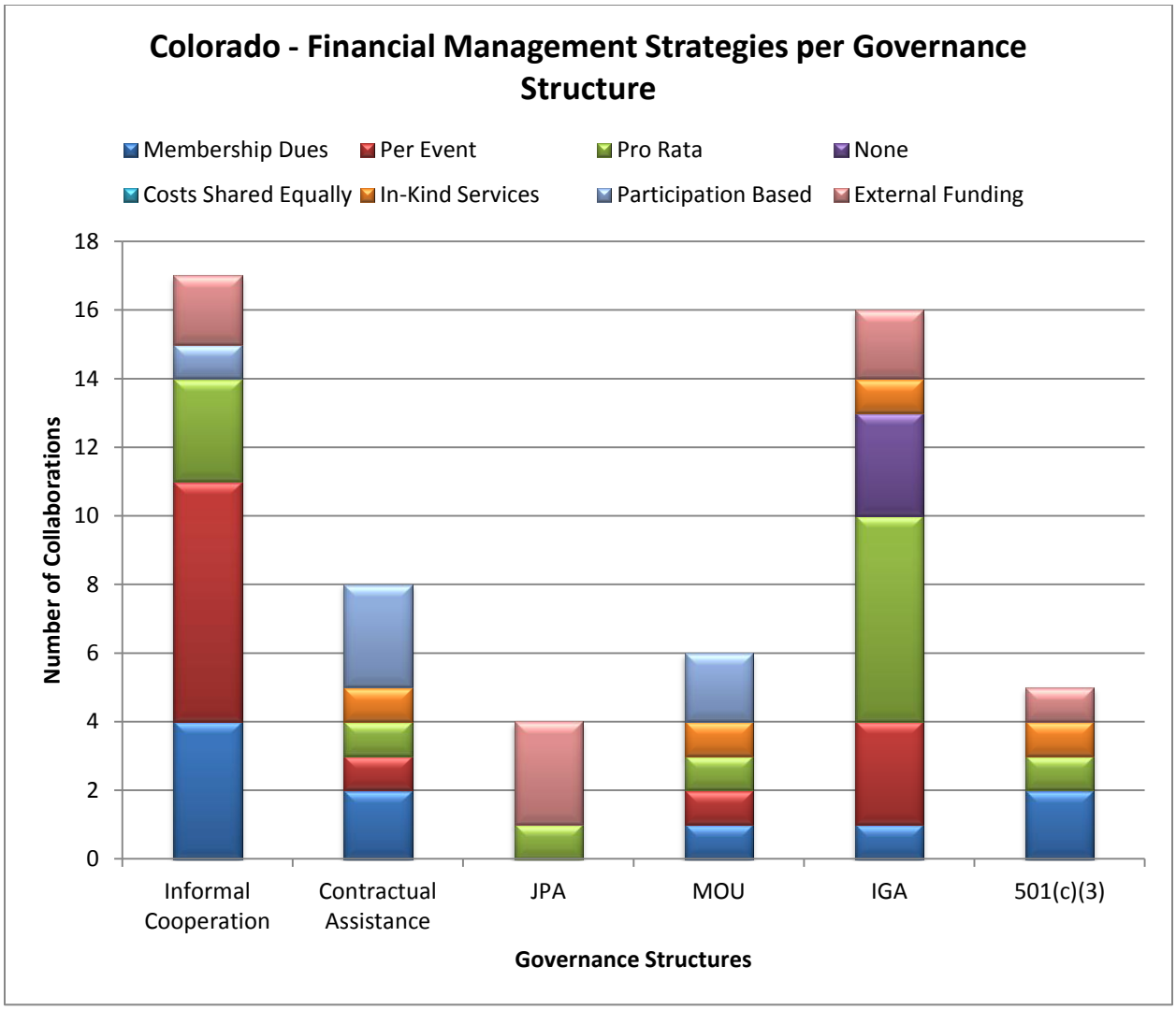

FIGURE 41. COLORADO - FINANCIAL MANAGEMENT STRATEGIES PER GOVERNANCE STRUCTURE

PRO RATA

Pro rata was the most common cost model of the collaboratives in both studies. A system of pro rata financial management means that collaborating entities paid in proportion to a standard amount, either based on the benefit gained by the entity, water amounts used, overall costs or a pre-defined standard. Several examples of previously discussed collaborations utilizing this type of financial management are listed below:

- Each entity in the City of Pueblo Flow Program pays a pro-rata share of the $50,000 readiness-to-serve charge to use the agricultural reservoir. The pro-rata basis for dividing the $50,000 cost is based on the quantity of water that each entity stored during the year in the reservoir.

- The Sub-Regional Operating Group with the City of Mesa also works on a pro-rata basis. Each member pays a proportionate share of the related treatment costs based on flows and loads. Members also contribute to capital costs related to purchased capacity.

- Each member in the Directors of Utilities Committee in the Hampton Roads Planning District Commission budgets annually for basic water and wastewater program support provided by HRPDC staff, as well as the time and expense to participate on the committee and various subcommittees. The amount is determined on a pro rata basis tied to the number of metered water or sewer accounts. Some agencies may choose to support projects that are not related to their specific services. The annual budget is about $750,000 for both programs and projects, including staff.

- The Southern Delivery System is a regional project bringing Arkansas River water stored in Pueblo Reservoir to Colorado Springs, Fountain, Security and Pueblo West. All contributions are based on percentage of current construction that ultimately benefits each member. Different components of the system are charged at a different rate depending on how each collaborating entity will be affected. For example, Pueblo West is located at the foot of reservoir and gets water right as it comes out of reservoir, so they don't participate in rest of pipeline or the treatment plant.

- The Town of Hudson, CO collaborates on the Fort Lufton Water Treatment plant, which filters mountain surface water from the Southern Colorado water conservancy district. The plant is jointly owned and the Town of Hudson pays a pre-defined standard of one-sixth of the cost of the plant while Fort Lufton does the remaining five-sixths of the cost.

MEMBERSHIP DUES

Charging membership dues and fees was the second most common cost model of the collaboratives in both studies. Membership fees and dues were sometimes scaled based on the size of the utility and sometimes standard across all collaborating entities in order to cover costs. Several examples of previously discussed collaborations utilizing this type of financial management are listed below:

- The Catawba-Wateree Water Management Group is financed through membership dues, grants, and partnerships to leverage funds. The total budget is determined by the group, with the amount determined proportioned based on relative water withdrawal to set annual dues. The total annual budget runs around $500,000, with the two largest entities paying the bulk of the load, at $350,000. All other entities pay significantly smaller amounts, but still retain equal 'one vote' status, which has caused some issues.

- The Mid-Arkansas Water Alliance is a not-for-profit membership corporation that includes 25 member agencies. It charges $750 annual membership dues that are used to finance the activities of the collaborative, which include securing long-term sources of high quality drinking water for its membership.

- The Portland Regional Water Providers Consortium shares its costs among the ~26 member entities using a dues formula defined in the IGA. The formula is based on the size of the entity, 50% from the number of customer accounts and 50% based on the annual average water demand from the prior year. Two members have indexed dues (Metro and another city outside the region that is only participating based on the conservation program). This money is used to implement regional conservation programs, a regional emergency preparedness program, purchase emergency portable distribution systems, GIS mapping of regional transmission and storage, and update the regional water supply plan every 5 to 10 years.

- The City of Hillsboro Joint Water Commission is financed through payments by the 5 agency partners. Operating costs are allocated based on a rolling 12-month average of water delivers from the Joint Water Commission. Capital costs are based on ownership shares.

- The Littleton/Englewood Wastewater Treatment Plant collaborates in the Barr Milton Watershed Association, which up until recently has had three different funding mechanisms. This included a 319 grant from the EPA and the DPHE, providing funding up until last year due to a national requirement, a dues structure based on the level of membership within the organization and in-kind services. This grant has now expired, so the membership dues for the collaboration will be increased a little.

NONE

Eleven of the collaboratives from both surveys had no defined financial management structure at the time of the interviews for varying reasons. Several examples of previously discussed collaborations utilizing this type of financial management are listed below:

- The Lake Erie Water Quality Collaborative had no financial impact or need due to the lack of a formal organization.
- The Central Iowa Regional Drinking Water Commission has voluntary activities so they're funded as part of individual utility budgets; there is no separate funding for the commission. There are no costs to share; all members contribute time and planning expertise.
- The San Diego County Regional Procurement Committee also has no formal financial management, everyone pays their own costs.
- Security Water & Sanitation Districts collaborate frequently with the Pikes Peak Area Council of Governments (COG) on the Water Quality management committee. The meeting meets monthly to discuss current topics of legislation and regulation. There is no funding structure since the COG covers the meeting costs.

PER EVENT

The per event cost model is participation based model that only charges utilities per event in which they participate. Some of the collaborations using a per event cost model include:

- Each member in the Colorado Municipal Forum on Trenchless Technology pays its own attendance costs for those who come to a specific meeting.
- The Prince William County Service Authority Regional Training Program is funded from the training budget that each utility has on a course by course basis. If member agencies are interested in the training then

they can come and buy a seat, or multiple seats, depending on how many people want to attend from each utility.

- Five signatories to the BACWA JPA provide approximately 65% of the annual budget and the remaining member agencies pay per event to cover additional costs.

- The stormwater collaboration that Eagle River Water & Sanitation District has with the Town of Vail has no signed agreement and the financial structure is on an as-needed basis. The collaboration does exercises to practice and prepare for events and in the case of event have an understanding to help out member entities.

- CoWARN is another example of a per event funding strategy. This collaboration involves several Colorado utilities that have signed mutual aid agreements to help one another in the event of an emergency. The financial structure is solely based on response, as an event occurs other utilities will provide resources based on need and then invoice for those services after the event.

COSTS EQUALLY SHARED

Another type of financial management involves equally sharing costs between utilities regardless of size or participation. None of the collaborations surveyed in the Colorado study utilized this financial strategy. A few examples from the AWWA study are described below:

- The LADWP Multi-Agency Benchmarking Program ran from 2004 to 2010, with 33 entities that shared costs equally, with each member agency providing approximately $10,000 to help pay for studies and the consultancy for the first couple of years. After the funding ran out, which also corresponded with a decreased need for sharing lessons learned and management practices, the collaboration ended.

- The San Diego Integrated Regional Water Management Program equally shares costs among the three lead agencies. They are budgeted to provide for a multi-year contract, with approximately $300K to $400K each.

- The Shelby-Frankfort Water Management Group, KY, is financed using grants, loans and contributions from members. All costs are equally shared.

IN-KIND SERVICES

In-kind services can include time or other resources that provide benefit to the collaborative rather than spending money. Three collaboratives from the Colorado surveys and two collaboratives that were interviewed in the AWWA National Inventory listed in-kind services as their financial management. Both collaboratives in the AWWA National Inventory were collaboratives in which the City of Mesa, AZ, participates:

- The East Valley Water Forum is a collaborative among 6 entities. It was provided a grant from the Arizona Department of Water Resources for initial funding in 2003. Those who participate in the collaboration now provide in-kind assistance through time or other resources.

- The Gila River Indian Community Water Rights Settlement Act of 2005 also shares costs of activities among members through in-kind services. Each party pays its own operational costs. The City of Mesa delivers the reclaimed water to the Community at no cost. Mesa also pays for the energy-only portion of the Colorado River water. The federal government pays the fixed OM&R portion of the Colorado River water on behalf of the Community through the Lower Basin Development Fund. The annual budget is about $500,000 and the two largest entities carry the bulk of the load at approximately $350,000. All other members pay smaller amounts, yet all retain equal 'one vote' status, which can be an issue at times.

- As mentioned previously, the Barr Milton Watershed Association, up until recently, has had three different funding mechanisms. This included a 319 grant from the EPA and the DPHE, a dues structure based on the level of membership within the organization and in-kind services. This grant has now expired, so the membership dues for the collaboration will be increased a little, while in-kind services will remain the same.

- The South Platte Coalition for Urban River Evaluation coordinates sampling activity on the South Platte River, with each member agency responsible for 1 or 2 sampling locations. Funding for this collaboration

is through membership dues, based on whether or not a member has a discharge permit and/or the size of the utility and in-kind services.

PARTICIPATION BASED

This type of financial management utilizes participation fees on specific projects that member agencies can choose to collaborate on. Five collaboratives from the Colorado study and two of the collaboratives in the AWWA study used a participation based cost model:

- The Bay Area Security Information Collaborative has a participation based clause in the charter. The clause says that if the BASIC group embarks upon a project costing money, each agency can choose to participate to receive the benefit of the project, with equally shared contributions from all participating agencies. When BASIC created an emergency planning exercise, it was paid for by member utilities that chose to participate.

- The Jordan Lake Partnership, NC, supports the costs of its activities via participating agencies that are billed proportionate to their participation and/or benefit from the service provided.

- The Colorado Wastewater Utility Council addresses issues of common interest to wastewater utilities across the state. They have a dues structure based on utility size, but occasionally there are special assessments for projects that people can volunteer to participate in and pay extra funds for the project.

- Participants in the Colorado Nutrient Coalition provide in-kind contributions in terms of dedicating personnel and time for projects. However, when a cash contribution is needed, like to hire a consultant, requests go out to members and people pledge a certain amount based on their interest in participation for the project.

EXTERNAL FUNDING

This financial management type utilizes funding from external sources, such as grants or leveed taxes, rather than from member entities. None of the collaborations in the AWWA National Inventory listed these in their financial

approach and eight collaboratives in the Colorado surveys indicated external funding as part of their financial management strategy:

- The Northern Colorado Water Conservancy District levees taxes on all properties in the district to help operate and maintain the reservoir and distribution system delivering water from the western slope to the eastern slope through the tunnels underneath Rocky Mountain National Park. The collaboration also works on ways to further develop water resources for the benefit of the people involved, like the Windy Gap project.

- The Urban Drainage and Flood Control District also levees taxes on properties within the district to generate revenue. This collaboration formed primarily as a result of water flood events on the South Platte River and funds capital flood mitigation projects, O&M programs for constructed drainage facilities, the flood hazard warning program that involves monitoring various rain gauges and stream gauges through the district, and looks at various plans for the future with respect to flooding and stormwater drainage.

- The City of Pueblo Wastewater Department collaborates with Colorado State University on various treatment processes needs, including research on water quality and analytical methods. Most of the time funding for these projects is supported by a grants the university receives.

BENEFITS OF REGIONAL COLLABORATION

Research Questions Addressed

9. Identify benefits for utilities interested in regional collaboration efforts.

SURVEY METHOD AND RESPONSES

For the AWWA National Inventory, the collaboratives were asked to "describe the general outcomes and benefits that were achieved through the collaborative." The survey form was pre-loaded with 5 numbered spots. However, collaboratives were not required to fill in 5 items. As such, the number of items included ranged from zero (3 collaboratives) to seven (4 collaboratives); the median number of benefits listed was three. The total number of benefits described by all of the collaboratives in the AWWA National Inventory was 144. For the Colorado study, this question was not asked on the survey, but rather in the follow-up phone interviews. This question was, "Describe some of the general outcomes and benefits achieved through your utility's involvement in these collaborations." The number of benefits was not quantifiable.

CONTENT ANALYSIS OF BENEFIT RESPONSES

An ethnographic approach was taken to explore the range of themes in the benefit statements. First, all of the responses were read, and classified into different themes. A few ideas did not easily fit into 1 or more of these areas. After the themes were identified, all of the statements were re-read and it they fit into one of the areas, this was logged. Sometimes a single collaborative had more than 1 benefit listed that fit into the same general category (i.e. multiple specific types of cost savings), but each theme was only counted once per collaborative.

The 19 benefit categories that were described by more than one collaborative are listed below (

Table 9). Quotes from the collaborative interviews that exemplify each theme are shown as examples. Four theme areas were most common: saving money or lower costs; regulatory/policy coordination, influence, and communication with legislatures and regulators; information sharing and communication benefits; and shared water resources planning to create more reliable water supplies.

TABLE 9. COLLABORATIVE BENEFIT AREAS

Benefit area	Example statements	# of collaboratives (AWWA)	# of collaboratives (Colorado)
Save money, lower costs	"avoided capital costs", "economy of scale created was realized as a significant benefit from this effort"	16	11
Information sharing, better communication	"improved communication between water systems"	16	7
Shared resources, water basin planning, reliable water supply	"Agreement on impacts and solutions for future groundwater basin management"	16	5
Clout, cooperation, and/or advocacy with regulators or policy makers	"single point of contact with regulatory agencies simplifies negotiations"	15	4
Shared, common, and/or consistent procedures, models, demand projections	"Regionally consistent programs and reporting practices	9	3
Collaborative partnership itself, the collaboration framework	"Provides a framework for further consolidation and collaboration efforts by members"	9	4
Ability to win grants or loans	"Regional group is more attractive for grants and low interest loans"	7	2
Security, emergency, and disaster preparedness	"Performed/planned an emergency scenario and did a desk top exercise that was a valuable thing"	6	1
Training: shared, increased, better	"not all utilities have funding/personnel to send people to industry conferences…. If one member of the collaborative can attend the conference, they can share what they learned with the group, reducing the travel expense and personnel commitment for the other members."	5	0
Share infrastructure (that saves money)	"Consolidated water treatment works, avoided capital costs"	5	2
Water quality benefits	"water quality problems have been resolved"	5	8
Better technical studies by pooling funds; shared research priorities	"Pooling of funds allows more expensive technical studies to be undertaken."	5	0
Regulatory or permit compliance	"Regulatory compliance including SSOs, groundwater, water treatment all benefit from collaboration and committee's help"	5	4
Future plans or benefits	"Future projects that would generate positive outcomes/benefits…."	5	3

Benefit area	Example statements	# of collaboratives (AWWA)	# of collaboratives (Colorado)
Industry, business, manufacturer collaboration benefits	"members benefit from being able to voice their needs and opinions to the manufacturers while simultaneously being kept informed of the latest products and trends in the industry;7. manufacturers and vendors benefit from getting information directly from the utilities; not only on product performance, but also about needs that should be filled within the industry. "	4	0
Operational synergy	"Synergies incorporated in the operation of the plant."	4	2
Minimize disputes, resolve disputes	"Improved relationship – reduction in legal disputes."	3	1
Public trust, information sharing	"Intangible benefit – suburban communities have built a greater trust in CDW"	3	3
Improved customer service	"Improved service through Wholesale Automated Meter Reading Software."	3	3

Many of these benefits can be loosely characterized into supporting the triple bottom line through the three pillars of sustainability: economic, environmental, and social. Each of these areas will be elaborated on below, with some specific examples provided to highlight each dimension.

Economic Benefits

Economic benefits were frequently cited by the collaboratives. Some of these benefits were in terms of avoided capital costs due to shared infrastructure. Lower operation and maintenance costs were cited due to economy of scale when negotiating chemical purchasing or shared monitoring. Cost savings associated with employee training were also cited. Better ability to compete for grants and receive loans is another economic benefit. Some examples of economic benefits are listed in

Table 10.

TABLE 10. ECONOMIC BENEFITS

Collaborative or Utility	Benefit
AWWA National Inventory	
Anderson Regional Joint Water System	Consolidated water treatment works avoided capital costs
Consortium for High Tech Investigation in Water and Wastewater (CHIWAWA)	Two Universities have been successful in securing State and Federal funding to carry out needed research
Detroit Water and Sewerage Department Technical Advisory Committee	Capital investment reduction thru collaboration with customers
Lake Allatoona/Upper Etowah River Comprehensive Watershed Study	Reduces individual jurisdictions costs and frustrations High priority for securing federal funds
Prince William Council of Governments	Saves money through cooperative purchasing
San Diego County Water Authority: Regional Procurement Committee, CA	Better bids = pay less for contracts
Shelby/Frankfort Regional Water Management Group	Regional group is more attractive for grants and low interest loans
STOPR Group, FL (Toho Water Authority)	Regional compliance monitoring plan has saved the individual members significant funds as compared to what would have been required for each individual utility to have a separate monitoring program
Colorado Surveys	
City of Westminster	Cost savings on modeling and monitoring programs
Littleton/Englewood WWTP	Cost savings primarily through monitoring efforts
Security Water & Sanitation	As a relatively small entity, economies of scale make things possible with a group that can't do individually
Town of Hudson	Shared costs for sharing a facility
Mt. Werner Water & Sanitation	Sharing facilities also helps saving costs
City of Boulder	Economies of scale helps implement some larger projects and helps obtain additional funding for projects
City of Grand Junction	Cost sharing a very important part of developing extensive water quality database for the eastern slope

ENVIRONMENTAL BENEFITS

Only a few of the collaboratives listed environmental impacts among the benefits. These elements are summarized in Table 11. The water quality in environment (such as receiving water body, a river or lake) is an environmental benefit, while drinking water quality is more of a public health benefit. Some of the statements by the collaboratives were vague in this regard. In addition, planning for regional water supply issues was previously discussed.

TABLE 11. ENVIRONMENTAL BENEFITS FROM COLLABORATION: EXAMPLES

Benefit area	Collaborative, State	Environmental Benefit Statement
Shared resources, water basin planning, reliable water supply	East Valley Water Forum, AZ	Agreement on impacts and solutions for future groundwater basin management
	City of Grand Junction, CO	Has a lot of shared interests within the watershed area and works together to make sure everyone involved is aware and in agreement towards shared outcomes.
	City of Westminster, CO	The stakeholder process and getting the right people and resources together has helped them to be successful in getting a site-specific standard for Standley Lake and
	Littleton/Englewood WWTP, CO	Lots of shared resources in all collaboration involvement
Water quality benefits	Upper Occoquan Service Authority, VA	Protect environment Improved Chesapeake Bay water quality Meet all water quality standards with growth within limits of policy
	City of Mesa: The Sub-Regional Operating Group (SROG), AZ	Area-wide water quality planning Maximize beneficial use of reclaimed water
	City of Grand Junction, CO	Meeting the federal water quality standards efficiently and effectively
	Town of Hudson, CO	Higher water quality
Better technical studies by pooling funds; shared research priorities	Consortium for High Tech Investigation in Water and Wastewater (CHIWAWA), TX	It is expected that significant successes in the area of desalination will occur once some of the proposed/ongoing research has been completed.

SOCIAL BENEFITS

A number of the benefits of regional collaboration among water utilities could be classified as social benefits. These include improved customer service, greater public trust facilitated by improved information sharing, increased training and knowledge sharing, and relationships with regulatory agencies. Examples of these social benefits are highlighted in Table 12.

TABLE 12. SOCIAL BENEFITS FROM COLLABORATION: EXAMPLES

Benefit area	Collaborative, State	Social Benefit Statement
Information sharing and communication	Bay Area Clean Water Agencies, CA	Information sharing across the more than 100 wastewater agencies in the Bay Area.
	BASIC - Bay Area Security Information Collaborative	members highly value the ability to compare and contrast security practices and share information
	Catawba-Wateree Water Management Group (WMG)	Improved communication between water systems
	Lake Erie Water Quality	Benefit of expanded knowledge base; a greater appreciation and understanding of issues faced by other utilities
	Security Water & Sanitation, CO	As a relatively small entity sharing of information is very important
	City of Boulder, CO	Shares technical information and support for some projects by involving additional parties
	City of Grand Junction, CO	Works together to discuss issues and preferred outcomes, sharing information to present a unified response for the western slope to the eastern slope
Cooperation and advocacy with regulatory agencies	Bay Area Clean Water Agencies, CA	Better coordination on regulatory and policy issues. Single point of contact with regulatory agencies simplifies negotiations.
	Hampton Roads Planning District Commission: Directors of Utilities Committee	Group has strong influence at State level on water legislation and regulations. If State forms an advisory committee, they come to PDC for people. And once the PDC has a rep on the committee, he/she is able to communicate two ways – both from PDC to State and from 16 organizations/entities into the State. Enhances effectiveness and speed of state-local communication and feedback.
	Prince William: Board of Virginia Association of Water and Waste Authorities	The legislatures like having an organization they can ask questions of. They appreciate the fact that there's somebody out there that will talk to them.
	San Juan Water District: Regional Water Authority	More clout with county council
	Metro Wastewater Reclamation District, CO	Ability to help guide regulations as being developed more consensus/less of an adversarial situation.

Benefit area	Collaborative, State	Social Benefit Statement
	City of Pueblo WW Department, CO	Early warning of new regulatory initiatives. Opportunity to participate in the formation of those new rules. Opportunity to influence rules that are going to regulate your industry.
Dispute resolution	Detroit Water and Sewerage District TAC	Improved relationship – reduction in legal disputes.
	Washington Metropolitan Area Water Supply Coordination	Keeps 3 utilities from fighting
	Metro Wastewater Reclamation District, CO	Creates more consensus/less of an adversarial situation
Increased training	Prince William: Regional Training Program	More training opportunities for more people.
Public trust	Shelby/Frankfort Regional Water Management Group	Improved community and stakeholder understanding of water supply issues and needs
	Cleveland Water Service & Economic Development	Intangible benefit – suburban communities have built a greater trust in CDW A greater sense of partnership than CDW imposing its will Seeing dollars at work – tangible results within the community
	Lafayette Water Reclamation Facility, CO	The Keep it Clean partnership will be doing a lot of good outreach and efforts we're not suited to do to improve community understanding of stormwater issues
	City of Longmont, CO	Combining money and focusing programs rather than separate ones creates consistency of messaging across communities in the county
Improved customer service / relations	Detroit Water and Sewerage Department (DWSD): TAC	Capital Investment reduction, thru collaboration with customers. Improved service (pressure / distribution / meter maintenance) through Wholesale Automated Meter Reading Software
	Central Iowa Regional Drinking Water Commission	Better understanding and agreement among suburbs/members on how the cost of water is priced
	City of Fort Collins, CO	Better understanding of customer needs - especially with big key accounts and knowing what they need.
Relations with industry and manufacturers	San Diego County Water Authority: Regional Procurement Committee	Contractors and labor have said they like this – they get a “heads up” on what is going out to bid
	Colorado Municipal Forum on	Identification of problem issues that need attention

Benefit area	Collaborative, State	Social Benefit Statement
	Trenchless Technology	through research, better inspection, etc. (a strong benefit to the TTC) Improved confidence in the appropriate use of the various techniques. (a strong benefit to the industry)
	Eastern Meter Management Association	Members benefit from being able to voice their needs and opinions to the manufacturers while simultaneously being kept informed of the latest products and trends in the industry; manufacturers and vendors benefit from getting information directly from the utilities on product performance and about needs that should be filled within the industry.

LESSONS LEARNED

There were three questions related to lessons learned for both studies:

- What were the critical factors that led to the success of the collaborative?
- Please describe the key challenges / constraints faced by the collaborative
- Please describe any significant roadblocks or barrier that others should be aware of.

Research Questions Addressed

10. Establish if there are any universal good practices for regional collaborations
    a. Identify critical factors that led to the success of the collaborative
    b. Identify key challenges / constraints faced by the collaborative
    c. Identify any significant roadblocks or barrier faced by the collaborative

The only difference between the studies was for the Colorado survey, the first question changed to "What were the critical factors that led to the success **for your utility's involvement in** the collaborative?" This change was made to examine these lessons learned from the utility's perspective. There was often an overlap of the ideas presented in the responses to these questions. Something identified as a success factor for one collaborative was sometimes a barrier for others. Results are summarized below.

CRITICAL FACTORS FOR SUCCESS

For success factors, there was a great diversity of ideas evident. Some common themes were: the collaborative must address a common need/driver for collaboration; trust; leadership; flexibility; commitment; open communication; and building relationships. Several examples of critical success factors listed by previously discussed collaborations are described below in Table 13.

It is interesting to note that some of these collaborations describe critical factors for success that are the opposite of other collaboration's factors for success. Some listed not involving attorneys until the end as critical to their success while others said developing solid relationships with lawyers was key. Others cited the simple, informal structure of their collaboration as helpful, whereas others had a complicated, formal agreement that was a key factor in the utilities willingness to work together.

TABLE 13. CRITICAL FACTORS FOR SUCCESS FROM BOTH SURVEYS

Critical Success Factor	Example Statements
Common need/driver for collaboration	"having a really good conflict as a key to success, since people get interested in the conflict and want to be involved in solving it" "the stakeholder process and getting all right people in the room"
Trust	"Some of the utilities just prefer to go it alone, whereas others have enjoyed collaborating and have built up a good friendship. Once some utilities were able to let go of worrying about turf or someone stealing a good idea, collaboration increased and it ends up helping everybody." "ensuring that everyone is communicating and communicating well, which comes from building up trust" "establishing good relationships with the state government and developing a level of trust. There is a great deal of expertise on both sides, allowing common concerns and different viewpoints to be addressed. This attitude of trust also prevents acrimonious disagreements."
Leadership	"having a complicated, formal agreement for this collaboration was part of the success" "bonding capacity and political will as well as the attitude expressed by a previous Commissioner that extended a sense of ownership and partnership for solving problems"
Flexibility	"the fact that the utilities have chosen to keep the collaborative informal, simple and manageable…not overly complicating the organization or the collaboration's communications with formal burdensome processes is helpful"
Open Communication	"The dividends from communication and information sharing, in particular, cannot be overstated. Because they are in constant communication with each other by email, members can find out quickly what is going on." "Aside from knowing the lawyers, the regulators are also very important to have a relationship with, especially since they're involved more heavily on the wastewater treatment side than the water side." "having the lawyers involved in looking at the collaborative formation process in the beginning really helped out. As the engineers came up with something they thought would work, the lawyers and elected officials would say no way, so keeping them involved throughout the entire process helped prevent setbacks and additional conflicts"
Building Relationships	"developing solid relationships with the lawyers since they know more about the settlement agreements and legal reasoning behind them, which drive a lot of the rate methodology and oversight of the wastewater treatment process."
Other	"needs to be political support for the collaboration" "having the support of board of directors and attorneys was a critical factor for their success. Sometimes the work for these collaborations doesn't directly relate to the collaborators job, but having a supportive boss that recognizes that the work employees do for the collaboration actually benefits the entire water and wastewater community in state of Colorado allows them to be successful."

CHALLENGES AND CONSTRAINTS

There were several different ideas presented for the key challenges or constraints faced by the collaboratives. The most common challenges and constraints were financial, politics/bureaucracy, time, legal / regulatory, sustaining interest, trust, and consensus building. Several examples are described below in Table 14.

TABLE 14. CHALLENGES AND CONSTRAINTS FROM BOTH SURVEYS

Challenges and Constraints	Example Statements
Financial	"Funding! Most collaborators are government entities and everyone is usually strapped for cash." "Time and money, there's always more work to be done than there is time or funding available" "For some voluntary groups, some members fund a lot, while others are not funding at the same level"
Politics/Bureaucracy	"own governance structure is a challenge, since specific design protects members from individually unwanted expansion costs. Thus, non-participating members can exercise almost veto power over debt issues." "same informality that one collaborative notes as a critical factor leading to the success of the collaborative was also noted as a key challenge since it can impair sustaining the interest in the collaborative. The same factors that made the collaborative easy to start could also make it easy to end as well." "The way the governance structure is set up, each member's decision making body has to approve amendments to the main IGA, so if one person doesn't sign, the whole process is stymied. In addition, by-laws had to be written early on to accommodate entities that dissented on policy actions and, for instance, did not want their name on a letter." "some challenges regarding the amount of power a larger member entity would wield… concerns that they would usurp their influence or relevance. In addition, local municipalities with a more growth-oriented strategy were concerned about the additional power of the collaboration." "while the utility may know what the challenges are and various ways to solve problems, there is a lack of understanding and often a lack of support at the city or council level"
Time	"The key personalities and drivers behind the elected boards, councils, and commissions of the individual members can change over time and make it feel like 'herding cats'. The revolving membership, with some dropping out and either returning or not returning and others being added also provide challenges. Logistics of meeting planning and operation issues for such a large body, as well as getting a quorum at a meeting to take action is another challenge." "Time and money, there's always more work to be done than there is time or funding

Challenges and Constraints	Example Statements
	available”
Legal/Regulatory	“ensuring regulatory agencies maintain a spirit of partnership and creating clear ‘sideboards’ for discussions in advance to prevent scope encroaching into other areas." “faced challenges including numerous questions and concerns from legislature members, having the capacity to follow the negotiations throughout the legislative process to ensure issues can be represented properly and timely and federal bureaucracy”
Sustaining Interest	“struggled with inactivity and a subsiding level of challenge, creating difficulties for members to actually focus on something collaboratively that needed to be done…when the energy is low, getting together in the meeting format, even quarterly, becomes a lower priority, and the same people end up having to bear the burden of projects”
Trust	“personalities involved in the negotiating groups and getting everyone educated to what the facts of the situation were; this discussion was challenging since several agencies didn’t trust one another” “First there was apprehension about committing to the partnership and people looking out exclusively for benefits for their own jurisdictions. Then there was concern over what they will lose in the transaction versus what will be gained. One of the biggest challenges was fear of what’s not unknown in the change, even if the current circumstance is not great (the devil we know versus the devil we don’t).”
Consensus Building	“accomplishing the goal of not getting in each other’s way, while respecting that each agency has its own priorities.” “There can be big differences in goals with members, particularly with Colorado Nutrient Coalition since it’s more adversarial between us and state and some members don't agree with all decisions of other members.”
Others	“Different interests for different stakeholders. It takes effort to make sure everyone’s needs are met. In addition, with different stakeholders coming and going it’s difficult to make sure everyone understands the history and where we’ve been.”

BARRIERS AND ROAD BLOCKS

The lowest response on the AWWA National Inventory was to the roadblock and barriers question, with 20 collaboratives providing no response. All 18 utilities interviewed in the Colorado study provided a response to this question, four of these stated they had not encountered any roadblocks or barriers in their collaborative efforts. Common themes were: trust, politics, funding, size (challenges with very large number of collaborators), relationships, personalities, differing values, willingness to compromise, and ability to resolve disputes. Other ideas included crossing geopolitical boundaries (crossing state or county lines), partnership in some areas despite ongoing disputes/litigation, and longterm commitment. Many of these barriers and road blocks repeat some of the challenges and constraints discussed above. Specific examples from this study are highlighted below in Table 15.

TABLE 15. ROADBLOCKS AND BARRIERS FROM BOTH SURVEYS

Roadblocks/Barriers	Example Statements
Trust	"This lack of trust also made it challenging to discuss 'facts' of a situation and a neutral party that everyone trusts seemed necessary to explain the facts to the group." "Old styles of thinking, assumptions that aren't correct about partners: that they don't care or aren't being honest or forthcoming. But when relationships are new you just have to work through natural suspicion."
Politics	"basin-wide political dynamics that could impose barriers or roadblocks to the collaborative" "lack of ability to require localities to change policies or standards to be regionally consistent. In order to solve this problem they indicated peer pressure as a potential solution for some instances, but then there was the risk that some members may withdraw funding, which could then lead to 'free rider' benefits." "parochial attitudes and breaking through political boundary barriers that often arose from external issues unrelated to water, and resulted in imposing attitudes, resentment and even retaliation between entities and their governing bodies"
Funding	"having to deal with the utility's own governing body, the upper administration. They worry about financial side of collaborations and this can cost a lot of money. A collaboration has to provide some benefit to those collaborating, and will have to convince decision makers of the value of the cost of the collaboration."
Size	"Not getting smaller stakeholders involved."
Relationships	"Ensuring that all involved stakeholders are communicating with each other and also with their superiors"
Personalities	
Differing values	"differences in values regarding the sophistication and redundancy of the system and

Roadblocks/Barriers	Example Statements
	facilities”
Willingness to compromise	“compromising and willingness of each member to share in the partnership.”
Ability to resolve disputes	“disputes related to operational and financial changes, addressing these disputes fairly and equitably by the parties, and enabling a reasonable give and take by each party to ensure the collaborative moves forward.” “At some point there will be a point of conflict, you will have to back up to where everyone agrees and then slowly return to the point of conflict to see if you can get through it and get everyone back on the same page. If you can’t get everyone past the first point of conflict chances of success are limited”
Others	“necessity for ‘out of the box’ thinking and attitude as a significant barrier. They also discussed perception management as critical and a potential barrier if not addressed appropriately. In addition, more outreach is really needed to propagate.” “need for upper management of the participants to understand the value of the collaborative and support the time required to make it work” “Making sure everyone does their fair share.” “Not planning ahead and knowing what you’re trying to achieve before starting agreements or collaborations.”

Missed Opportunities

Research Questions Addressed

11. Determine areas of missed opportunities for regional collaborations

There was also a brief discussion on potentially missed opportunities for utility collaborations during the phone interviews. Six of the 18 utilities surveyed stated there weren't any missed opportunities from their perspective. Two utilities wanted more collaboration on nutrient regulations. One utility mentioned more collaboration on source water protection through the Water Quality Control Commission and the Clean Water Act. Some other areas of potential collaboration utilities were interested in included:

- Energy conservation, especially with regards to technical work and information sharing of things that worked and those that didn't.
- Regulatory barriers: For example, drinking water treatment plants have residuals and wastewater treatment plants have biosolids, essentially the same thing. Ideally, both plants could combine resources for disposal and save money, but current regulations and permitting make that difficult.
- Pharmaceuticals are going to be a big issue in 5 to 10 years, but standardized procedures haven't been developed since the technologies are so new and analytical methods not widely publicized
- Sharing equipment and training on that equipment
- Greatest missed opportunities to me are working with CU or other research organizations
- Working with private utilities and sharing information and best practices

Case Studies of Effective Collaboration from Colorado Utility Study

Each case study provides a basic description of a few of the reported collaborations from the utility's perspective. The date the collaboration initiated, meeting frequency, and financial management are briefly discussed. Then some general outcomes and benefits from the utility's relationship with each collaboration along with critical factors for success, key challenges/constraints, and roadblocks/barriers are reported.

City of Westminster

Snapshot

Westminster, CO
Total Pop. Served: 110,000
Collaborations Involved: 3

Benefits

- Cost savings
- Monitoring program data
- Watershed modeling

The City of Westminster is involved in at least 3 collaborations including the Big Dry Creek Watershed Association, Standley Lake Cities, and the Upper Clear Creek Watershed Association and others. A history of taste and odor problems in the 50s and 60s and again in the 80s from Standley Lake water led to the development of the Clear Creek Watershed Agreement.

Big Dry Creek Watershed Association

This 501(c)(3) organization initially started in 1997 to address ammonia levels in the watershed. The monitoring program has now expanded to address selenium and *E.coli* among other water quality concerns. They also provide data on chemical parameters and nutrients to the county control division, as well as conduct fish and macroinvertebrate surveys. Meetings are generally quarterly. Costs are shared between members based on flow and land area, since some participants don't have a treatment plant but have land area that contributes to stormwater. There is also some outside funding from the Woman Creek Reservoir Authority (aka Standley Lake Protection Project).

Standley Lake Cities

There are two aspects to this collaboration, cost sharing and watershed monitoring. The cost sharing agreement is between the Standley Lake Cities of Northglenn, Thornton, and Westminster based on how much water each has in Standley Lake. This collaboration began in the early 1990s.

Upper Clear Creek Watershed Association and others

This 501(c)(3) organization also began in the early 1990s and was formed to fight the Standley Lake Cities collaboration. There was concern that the Standley Lake Cities were going to come up the hill and make them put in additional wastewater treatment that they couldn't afford. This group meets monthly and members pay dues to cover costs.

Critical Factors for Success

The stakeholder process and getting all right people in the room has contributed to our success and in getting the site specific standard for Standley Lake. This takes a lot of time and energy to ensure that all of the right people are in the room. In addition that they're communicating and communicating well, which comes from building up trust.

Key Challenges

Different interests for different stakeholders. It takes effort to make sure everyone's needs are met. In addition with different stakeholders coming and going it's difficult to make sure everyone understands the history and where we've been.

Roadblocks/Barriers

Ensuring that all involved stakeholders are communicating with each other and also with their superiors.

Littleton/Englewood Wastewater Treatment Plant

Snapshot

Englewood, CO
Total Pop. Served: 260,000
Collaborations Involved: 8

Benefits

- Cost savings
- Shared resources and information

The Littleton/Englewood Wastewater Treatment Plant is involved in at least 8 collaborations, 4 of which are discussed below including the South Platte Coalition, Barr/Milton Watershed Association, Colorado Wastewater Utility Council, and CoWARN

South Platte Coalition

Fifteen years ago several entities combined forces to cooperate on water quality monitoring to save on costs from running individual programs. Each agency is responsible for 1 or 2 sampling locations using the same protocols and analyzing the same parameters so all of this data can be combined in a shared, common database. Monthly meetings and funding through dues based on whether or not the member has a discharge permit and the size of the utility. Also through in-kind services.

Barr/Milton Watershed Association

This watershed association is currently conducting a total maximum daily load study on Barr Lake and Milton Reservoirs, both just north of Denver, and also developing a watershed model. Started in 2005 and meets monthly. Up until now there were three funding sources, an EPA grant, membership dues, and in-kind services, but the EPA grant has expired so now membership dues will be increased to compensate a little.

Wastewater Utility Council

This addresses a wide range of common interest issues to wastewater utilities across the state. Started in 1991 and has monthly meetings. Utilizes a membership dues structure based on utility size.

CoWARN

The Littleton/Englewood Wastewater Treatment Plant isn't very involved in CoWARN since they haven't yet had any needs for emergency response. This is a formal organization where utilities sign agreements to help each other out in the case of some emergency. Began in 2005 and the financial structure is based on response.

Critical Factors for Success

Talking about issues up front before a situation develops and have to try to resolve things at the end. Also need to have a very clear message as to what will be accomplished when developing a collaborative.

Key Challenges

Funding! Another challenge that utilities face is that while the utility may know what the challenges are and various ways to solve problems, there is a lack of understanding and often a lack of support at the city or council level.

Roadblocks/Barriers

At some point there will be a point of conflict and you have to back up back to where everyone agrees and then come back to the point of conflict to see if you can get through it and get everyone back on the same page. If you can't get everyone past the first point of conflict chances of success are limited.

Security Water & Sanitation Districts

Security Water & Sanitation Districts Colorado are involved in at least 5 collaborations including the Fountain Valley Authority, Southern Delivery System, Pikes Peak Regional Water Authority, Lower Fountain Water Quality Management Association, and Pikes Peak Area Council of Government Water Quality Management Committee.

Snapshot

Security, CO
Total Pop. Served: 18,200
Collaborations Involved: 5

Benefits

- Economies of scale
- Shared information

Fountain Valley Authority

Security Water & Sanitation Districts has participated in this collaboration since 1979. This is a joint water project bringing water to 5 entities, including Colorado Springs since 1985. Quarterly meetings. Colorado Springs manages the project and members are assessed fixed and variable costs based on how much water each entity could take and how much each entity actually takes, respectively.

Southern Delivery System

This is currently in the construction phase, and members expect to get water in 2016. The project is broken down into components as they relate to each entity, with costs based on how each component benefits particular entities. Began in 2001 and formally meets monthly, with as needed meetings to fill in sometimes multiple times per week.

Pikes Peak Regional Water Authority

This is a collaboration of most of the major water suppliers in El Paso County and serves as a mechanism for members to cooperate on projects on an individual basis as they choose. Also has a focus on legislative and regulatory matters. Started around 1996 and meets monthly.

Lower Fountain Water Quality Management Association

This is a volunteer management agency under EPA Regulation 208 for water quality management and has review authority over wastewater treatment issues in the Fountain Creek Basin. It's a fairly informal gathering and also serves as a venue for a lot of information sharing and discussing current issues impacting water and wastewater utilities. Formed in the mid-1970s and assesses flat rate annual dues for each member that go towards monitoring efforts.

Pikes Peak Area Council of Government Water Quality Management Committee

Security Water & Sanitation Districts is also involved with Pikes Peak Area Council of Government (COG), mainly with the Water Quality Management Committee. The committee has some regulatory authority but primarily discusses current topics on legislation and regulation. There aren't any funding mechanisms since the COG covers all costs.

Critical Factors for Success

Willingness for entities to give and take.

Key Challenges

Willingness of entities to cooperate. Support of governing bodies and even the entities themselves.

Roadblocks/Barriers

Making sure everyone does their fair share.

City of Fort Collins Utilities

The City of Fort Collins Utilities are involved in at least 5 collaborations including the North Front Range Water Quality Planning Association, various intergovernmental service agreements, CoWARN, Water Innovation Cluster and Collaboration with CSU.

North Front Range Water Quality Planning Association

This is an EPA Regulation 208 organization that manages regional water quality planning. The group reviews wastewater plans for future regulations and makes recommendations to the Water Quality Control Division. They meet once a month and the financial fees are based on service population.

Intergovernmental Service Agreements

Fort Collins delivers water to several entities, like CSU, that manage their own distribution system, and also has lots of interconnects with different water districts. Since the 1960s these collaborations have ongoing meetings and collaborate through cost sharing and information sharing.

CoWARN

See Littleton/Englewood Wastewater Treatment Plant case study.

Water Innovation Cluster

This collaboration is geared towards developing innovative water projects by partnering with different entities. For example CSU implemented a greywater reuse system and are studying its usefulness and impacts.

Collaboration with CSU

Fort Collins Utilities has several ongoing projects via collaboration with CSU. They meet monthly.

Critical Factors for Success

Everyone needs to know what the purpose of the collaboration is and what the specific goals are. Also there needs to be political support for the collaboration.

Key Challenges

Having formal relationships that you would rather be information can be constraining when agreements all have to be approved by council.

Roadblocks/Barriers

Not planning ahead and knowing what you're trying to achieve before starting agreements or collaborations. Not getting smaller stakeholders involved.

Snapshot

Fort Collins, CO
Total Pop. Served: 120,000
Collaborations Involved: 5

Benefits

- Knowing customer needs
- Eliminates redundancies
- Delineates responsibilities
- Innovation

City of Pueblo Wastewater Department

The City of Pueblo Wastewater Department is involved in at least 5 collaborations including the Colorado Nutrient Coalition, Colorado Water Quality Forum, Colorado Wastewater Utility Council, COGs with Pueblo and Pikes Peak, and Colorado State University in Pueblo.

Colorado Nutrient Coalition

This coalition is group of industries, cities, agriculture stakeholders and interested citizens who are working with the health department to develop nutrient regulations for the state of Colorado. The collaboration began in mid-2010 and they meet once or twice a month. Most participants provide in-kind contributions for projects and if a cash contribution is needed members are requested to pledge certain amounts.

Colorado Water Quality Forum

This is primarily a policy group and informational session of upcoming issues and what the impacts might be. This group meets bimonthly and annual fees are assessed.

Collaboration with CSU- Pueblo

The wastewater utility has various needs in terms of water quality and analyzing different portions of the treatment process, while students need real work experience and practical application of analytical skills. This collaboration started in 2007 and meetings are on an as-needed basis. Mostly funded through university grant support.

Critical Factors for Success

Establish good relationships with the state government and developing a level of trust. There's a great deal of expertise on both sides, allowing common concerns and different viewpoints to be addressed. This attitude of trust also prevents acrimonious disagreements.

Key Challenges

Most collaborators are government entities and everyone is usually strapped for cash.

Snapshot

Pueblo, CO
Total Pop. Served: 107,000
Collaborations Involved: 5

Benefits

- Early warning of new regulatory initiatives
- Opportunity to participate in formation of new rules
- Opportunity to influence rules that are going to regulate your industry
- Opportunity to collect and analyze data

City of Grand Junction, CO

Snapshot

Grand Junction, CO
Total Pop. Served: 72000
Collaborations Involved: 17+

Benefits

- Shared outcomes
- Increased awareness
- Shared resources

The City of Grand Junction is involved in over 17 collaborations with their water and wastewater utilities. Some of these are discussed below.

Grand Mesa Pool Collaboration

On top of Grand Mesa there are a series of reservoir that store water for irrigation purposes and city use. They fill up in the springtime and are usually drained and empty by the end of the summer for farm irrigation/ranches. These reservoirs are all owned by different companies and the city. Rather than having several people running around and releasing water out of different reservoirs, the City of Grand Junction manages and operates the pool since we have a full-time staff during the summer, and keeps track of orders and water deliveries in Excel so it doesn't matter which reservoir the water came from. This collaboration began in the 1940s and meets each springtime to get things setup and again in the fall to talk about how things went and what improvements can be made.

BLM/USFS City Fire Fuel Management

This is a collaboration between the City of Grand Junction, the United States Forest Service (USFS), the United States Bureau of Land Management (BLM) and examines fire fuels present in the creeks and watershed. Once examined, they identify it, determine how catastrophic it would be if the fire fuels got started in a fire, and then develop a plan to thin out the vegetation in the watershed in a way that reduces the potential of catastrophic fire but doesn't harm wildlife habitats.

Towns of Ute and Clifton

We have interconnections in our water distribution system with Ute and Clifton throughout the city where we can give water to them or vice versa. So if something were to happen we could exchange or provide water for a short period of time. This collaboration meets monthly to discuss various issues pertaining to water, not only here in valley, but statewide and nationally. We have also developed a regional water conservation plan and a cooperative plan where we work together to do total retrofits, landscape audits and those sorts of things. There's also a children's water festival in May where 5th graders come and do educational hands-on activities and classes. Another major one area we collaborate in is an informational program about drought and what would happen if there was a prolonged drought here that would affect Grand Valley. We agreed to have a unified message as far as water usage goes, and that if one entity is short on water, the other two water utilities will follow suit and have similar restrictions.

Critical Factors for Success

One of the critical factors for success is that everyone knows where everyone else is coming from. Open and honest communication where we can speak up, say your mind, get it out on the table and then decide whether the issue is a big important issue or a minor thing we can get past. Moreover, speaking up so that there is not any kind of hidden concern or hidden agenda that not everyone else knows about.

Key Challenges

Every organization has their own specific, unique business that they run, each operation is slightly different than another one in terms of size, customers, board of directors, elected or not, rates are different, location of where they keep water is different. There might be an obvious solution to a particular problem and then we'll find that other water districts don't share same idea or same concern that we do, and vice versa.

Roadblocks/Barriers

Most of the time we're involved in long-term ongoing relationships, so maybe on some particular issues it doesn't go anywhere and we get frustrated, but we recognize that that entity is going to be around and we're going to continue having a relationship with them so we just kind of accept the fact and on some particular project it may not go anywhere but we recognize that in the future there might be others. The first reaction might be to cut someone off and not be involved with them anymore, but the fact is that you are going to continue having relationships with these organizations and its best not to get too frustrated and burn bridges behind you.

City of Longmont

Snapshot

Longmont, CO
Total Pop. Served: 86,000
Collaborations Involved: 10

Benefits

- Information sharing
- Stay modernized and adapt more quickly
- Creates synergies

The City of Longmont is involved in at least 10 collaborations including with the Colorado Department of Health and Environment (CDPHE), the EPA, Longmont Power & Communication, Longmont ITS, and the University of Colorado at Boulder. They are also involved in several smaller, transient collaborations that focus on specific projects and policies.

CDPHE & EPA

The CDPHE and EPA primarily regulate performance of utilities, but over the years these relationships have developed past a one-way communication into a more sophisticated collaboration. A lot of information, discussion and negotiating about what should be done and how to do it. A lot of voluntary presentation of information benefiting both sides. Meetings occur frequently with the CDPHE and quarterly with the EPA. CDPHE Fees are paid for a discharge permit for the wastewater utility and fees were recently reinstated for the water utility based on the population served to help the CDPHE recover some of the costs for their regulatory activity.

Longmont Power & Communication

Longmont Power & Communication is a separate department within the City of Longmont that provides power to the utilities. They collaborate regarding backup power for facilities and generated power during power outages or big construction projects. This collaboration began 100 years ago and since they share the same building everyone meets frequently. The utilities pay for services and some equipment, but not for professional advice.

University of Colorado, Boulder

The City of Longmont water and wastewater utilities collaborate with CU Boulder on various research projects. These projects help the utilities determine how to improve their operations, while CU Boulder researchers get the benefit of research value and publications. These collaborations began back in the 1980s, but waned over the years until recently when they were reestablished. Meetings occur on an as-needed basis and the utility either pays students directly or pays for the research.

Longmont ITS

Another City of Longmont department that the utilities collaborate with extensively is the ITS department, specifically regarding the SCADA network. This collaboration began about 3 years ago and has weekly meetings. The utilities pay for the SCADA support and any labor costs incurred.

Critical Factors for Success

Collaborating with someone by sharing information, ideas, and asking questions before a specific problem or need arises. Taking time to build and cultivate relationships. Finding the right people to work with in large, complex collaborations and organizations.

Key Challenges

Most collaborations have a commercial edge or a regulatory relationship, so there can be a natural suspicion about motives or needs. Often members can start out thinking that someone else is getting something at their expense, rather than the class win-win scenario. It's important to look past that and be proactive in communication and informative at times when it's not required, building trust and value in these relationships.

Roadblocks/Barriers

Old styles of thinking and assumptions that aren't correct about partners (i.e. they don't care about business or aren't being honest), have to be managed. Also have to be committed to the relationship or it won't succeed.

CHAPTER 6: SUMMARY & CONCLUSIONS

These surveys illustrated several examples of collaboration areas, governance structures, management types, benefits, and lessons learned from over 147 different regional collaborations. The research results provided in Chapter 5 answered the research questions posed in Chapter 3. A recap of these questions and findings is provided below.

1. How common is municipal water or wastewater utility involvement in regional collaborations? (Colorado)

    a. Do the majority of water and wastewater utilities participate in at least 1 collaboration? (Colorado)

    b. Is collaboration equally common in the drinking water and wastewater sectors? (Colorado)

There are over 2500 permitted utility systems in the state of Colorado, however only 26 utilities are represented in the Colorado survey. However, these 26 utilities serve over 60% of the total population of the state of Colorado. If these utilities are representative of the majority of utilities in the state, then regional collaboration is very common, with most utilities participating in at least 3 collaborations. However, since no utilities surveyed stated they were not involved in any collaborations, these studies aren't conclusive.

2. How long have utilities been involved in regional collaborations? (Both)

Collaborations are much older than initially anticipated. The oldest collaboration surveyed was 100 years old, (the Longmont Power & Communication with the City of Longmont water and wastewater utilities), with several over 20 years old. On average, the collaboratives represented in the Colorado study were older than those in the National survey. Long-standing collaborations indicate a successful collaboration that has retained its usefulness to members.

3. What are typical geographic constraints of regional collaborations? (Both)

    a. Can collaborations cross geo-political boundaries (i.e. state lines, county lines)? (Both)

Although there is a perception that regional collaborations are likely to be closely co-located geographically, several examples exist of more distant collaborations. For example, the Colorado Wastewater Utility Council involves collaborations with nearly all of the surveyed utilities; some located over 270 miles away In most collaboratives all of the participants are in a single state, like the Colorado Wastewater Utility Council, but there are a few exceptions for water basins that cross state lines. The national survey found 6 collaboratives with members in multiple states. It is unknown if any of the collaborations from the Colorado survey have participants across state lines, but there are several collaborations across county lines.

4. What size of utility typically participates in regional collaborations? (Both)

In Colorado the majority of utilities surveyed served populations between 5,000 to 150,000 people. Nationally there were several utilities that served upwards of 1 million people. Within these ranges the utility sizes were distributed roughly evenly. The typical size of a utility that participates in regional collaborations is at least 5,000 people served. However, this could also be because utilities that serve at least 5,000 people are easier to reach and involve in these studies.

5. Clarify how utilities become involved in these collaborations (Both)

    a. How do collaborations form? (National)

    b. Do collaborations last and evolve? (National)

There are several routes to forming collaborative arrangements. Some are formed out of necessity, in response to regulations, while others are formed out of good ideas addressing a common issue, and still others out of past relationships with other entities. The National survey found several drivers that led to the formation of regional collaborations, with the most common ones as water supply concerns, legislative and regulatory issues, and cost reductions. Each collaboration can have multiple drivers and the median number of drivers listed for each collaborative was two. A key indicator of successful management of a collaborative is whether or not it is sustainable and/or growing. Collaboratives that are sustainable have proven able to last for a long time without damaging relationships or creating additional issues. About 30% of the collaboratives from the AWWA National

Inventory and 63% of the collaborations from the Colorado survey have been working together for 11 or more years, indicating sustained activity. Growing collaboratives have demonstrated an ability to work beyond the initial driver that brought collaborating entities together. Several examples are described below. Of the 45 collaboratives who participated in the AWWA study, 69% listed more areas of current collaboration than initial drivers. This indicates that most collaboratives likely expanded their collaboration activities beyond those that initially brought the group together.

6. Highlight effective areas for regional collaboration (Both)

    a. What are the most common topics for collaboration? (Both)

    b. Do most collaboratives function on a tight and limited range of activities, or a broader range of activities? (Both)

The main collaboration areas for utilities surveyed in Colorado were legislative/regulatory issues, operational concerns and efficiencies, and environmental assessment. The least common area of collaboration was for recreational concerns with roughly 25% of utilities involved. The collaborations from the AWWA National Inventory listed water supply concerns, legislative/regulatory issues, and cost reductions as the most common areas of collaboration. The least common area of collaboration was technological research, with roughly 7% of collaborations involved. Most collaboratives from the National survey function in between 3 to 5 areas of activity, with a maximum of 7 of the 11 possible areas.

7. Define the types of governance structures for regional collaborations (Both)

    a. Are some areas of collaboration better suited to informal governance vs. others better suited to more formal arrangements? (Both)

The governance structures of the collaboratives from both studies ranged from informal to more formal contractual arrangements. The AWWA Inventory classified most collaborations as contractual assistance, while the Colorado survey had more informally structured and IGA-structured collaborations. The most significant difference between the two studies is the greater proportion of IGA-structured collaborations in the Colorado study

compared to the AWWA National Inventory. This could indicate that utilities prefer collaborations that are governed either informally or by an IGA, probably because of the familiarity with IGA-based structures due to their municipal nature. There doesn't appear to be any topics better suited to a particular form of governance structure or financial structure.

8. Define management structures for most regional collaborations. (Both)

    a. What financial management structures are common for regional collaborations? (Both)

The financial structures for each collaboration were categorized between: pro rata, membership dues, none, per event, costs equally shared, participation based, in-kind services, or external funding; each collaboration could have multiple financial approaches. The most common financial arrangements found were membership dues, pro rata or per event financial structures. For Colorado utilities there was also a large percentage that have external funding sources from grants or leveed taxes. Comparing financial management strategies per governance structure of collaboratives for both studies shows no particular trends.

9. Identify benefits for utilities interested in regional collaboration efforts. (Both)

Four theme areas were most common: saving money or lower costs; regulatory/policy coordination, influence, and communication with legislatures and regulators; information sharing and communication benefits; and shared water resources planning to create more reliable water supplies.

10. Establish if there are any universal good practices for regional collaborations (Both)

    a. Identify critical factors that led to the success of the collaborative (Both)
    b. Identify key challenges / constraints faced by the collaborative (Both)
    c. Identify any significant roadblocks or barrier faced by the collaborative (Both)

There was a great diversity of ideas evident for collaboration success factors. Some common themes were: the collaborative must address a common need/driver for collaboration; trust; leadership; flexibility; commitment; open communication; and building relationships. In addition, there were somewhat opposite ideas of the benefits

of an informal collaboration model versus having a defined structure and agreement. There were several different ideas presented for the key challenges or constraints faced by the collaboratives. The most common challenges and constraints were financial, politics/bureaucracy, time, legal/regulatory, sustaining interest, trust, and consensus building. Common themes for roadblocks and barriers were similar: trust, politics, funding, size (challenges with very large number of collaborators), relationships, personalities, differing values, willingness to compromise, and ability to resolve disputes.

11. Determine areas of missed opportunities for regional collaborations (Colorado)

Although six of the 18 utilities surveyed stated that there were not any missed opportunities from their perspective, the remaining utilities had various ideas on utility collaborations they felt should be developed further. These included nutrient regulations, energy conservation, pharmaceuticals, sharing equipment, and working with CU or other research organizations.

PRACTICAL IMPLICATIONS

To form and grow a collaborative effort, first the areas of collaboration must be clearly defined. From this a list of interested stakeholders can be developed and contacted to join the collaboration. Putting together an initial meeting with all parties involved can help determine the right people to be on the collaborative and the direction the collaboration should take. Each collaborative effort will be unique and depending on the areas of collaboration and the member entities preference, the governance and management structure can be chosen. These can start out more informally as the collaboration finds its footing and develop formal structures over time as the members see fit, or stay informal if that structure is effective. In order to maximize the success of the collaboration and minimize potential roadblocks or barriers, the member entities should periodically assess its strengths and weaknesses. It's just as important for the smaller utilities to have a voice in the collaborative efforts, as it is for the larger utilities involved. Building solid relationships and trust between all member entities should be prioritized to minimize potential conflicts and differences.

Regional collaborations are unique and diverse; there are no simple models for developing a successful collaboration. This study provides several useful examples of benefits and lessons learned. By examining the critical factors for success, challenges and constraints, and roadblocks and barriers described by the utilities and collaborations, other interested parties can get a better sense of guiding their own collaborations.

FURTHER WORK

The information presented on utility collaborations in this report is not intended to be exhaustive. There are therefore opportunities for further work. Some examples are:

- Try to find utilities that aren't involved in regional collaborations, or were involved in collaborations that failed or disbanded, to determine why and what can be learned from those situations.
- It would also be interesting to interview multiple members of a single regional collaboration to see if their perspectives on the benefits and challenges of the collaboration differ.
- Establish a Colorado state-wide collaboration on collaborations, including a database of examples and contact info for interested utilities to learn more about forming or enhancing their collaborative efforts

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APPENDIX

COLORADO PHASE 1 SURVEY

Water/Wastewater Utility Regional Collaborations

Exit this survey

This study is part of M.S. thesis research by Tamara Relph at the University of Colorado that aims to understand the scope of regional collaboration activities among water and/or wastewater utilities in Colorado. These collaborations may include entities such as regulators and power utilities, and range from very informal cooperation to formal structures. Thank you for your time.

1. What is the name of your utility?

2. What is the approximate service population of your utility?

3. List the names for collaborations that your utility is involved in:

Collaboration #1:	
Collaboration #2:	
Collaboration #3:	
Collaboration #4:	
Collaboration #5:	
Other:	

4. How many collaborators are there per collaboration (include different utilities, cities, counties, regulators, etc.)?

	Collaboration #1	Collaboration #2	Collaboration #3	Collaboration #4	Collaboration #5
3 to 5					
6 to 9					
10 to 19					
20 to 29					
More than 30					
Other (please specify)					

5. Areas of collaboration [check all that apply for any of the collaboratives above]

- Construct or Purchase Assets/Infrastructure
- Employee Training & Development
- Environmental Assessment
- Operational Concerns/Efficiencies
- Customer Service and Communications
- Recreational Concerns
- Emergency Planning/Response & Security
- Technological Research
- Cost reductions (i.e. sharing purchasing contracts, etc.)
- Water Supply Concerns
- Compliance with New Regulations
- Legislative/Regulatory Issues

Other (please specify)

6. What is the governance structure of the collaborations?

	Collaboration #1	Collaboration #2	Collaboration #3	Collaboration #4	Collaboration #5
JPA (Joint Powers Authority)					
MOU (Memorandum of Understanding)					
IGA (Intergovernmental Agreement)					
501(c)(3) (Charitable Organization)					
Contractual Assistance					
Informal Cooperation					

Other (please specify)

7. If you are willing to participate in a brief 20 minute follow-up interview please provide your contact info below.

Thank you for your participation!

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Done

COLORADO PHASE 1 SURVEY – COLLABORATION SUMMARY

TABLE 16. CO SURVEY - LIST OF COLLABORATIONS PER UTILITY

Collaboration	Utility Reporting Collaborative, County
Denver Regional Council of Government	City and County of Broomfield
MAPO	City and County of Broomfield
Mt States Employer Council	City and County of Broomfield
North Front Range Water Quality Planning Association	City and County of Broomfield
Rocky Mt. Water Environment Association	City and County of Broomfield
Wastewater Utility Council	City and County of Broomfield
Boulder County	City of Boulder (2)
Northern Colorado Water Conservancy District	City of Boulder (2)
Pine Brook Hills Water District	City of Boulder (2)
Sugar Loaf and Fourmile Fire Protection Districts	City of Boulder (2)
Town of Nederland	City of Boulder (2)
Urban Drainage and Flood Control District	City of Boulder (2)
Colorado Wastewater Utility Council	City of Boulder, CO
CoWARN	City of Boulder, CO
Local Emergency Response Committee	City of Boulder, CO
Research with USGS-CU-City of Boulder	City of Boulder, CO
Water Environment Federation	City of Boulder, CO
Collaboration with CSU	City of Fort Collins Utilities
CoWARN	City of Fort Collins Utilities
Intergovernmental service agreements	City of Fort Collins Utilities

North Front Range Water Quality Planning Association	City of Fort Collins Utilities
Water Innovation Cluster	City of Fort Collins Utilities
5-2-1 Drainage Authority	City of Grand Junction (1)
American Water Works Association	City of Grand Junction (2)
BLM Resource Management Plan	City of Grand Junction (2)
BLM/USFS/City Fire Fuels Management	City of Grand Junction (2)
City/Ute/Clifton utilities	City of Grand Junction (2)
Colorado Basin Roundtable (HB 1177)	City of Grand Junction (2)
Colorado Nutrient Coalition	City of Grand Junction (2)
Colorado River Cooperative	City of Grand Junction (2)
Colorado Wastewater Utility Council	City of Grand Junction (2)
Colorado Water Utility Council	City of Grand Junction (2)
Grand Mesa Pool	City of Grand Junction (2)
Grand Valley Wastewater utilities	City of Grand Junction (2)
Gunnison River Basin Roundtable	City of Grand Junction (2)
Historic Users Pools	City of Grand Junction (2)
Regional Water Conservation Planning	City of Grand Junction (2)
Water Center at Colorado Mesa University	City of Grand Junction (2)
Water Environment Federation	City of Grand Junction (2)
City of Grand Junction - Wastewater Services Division	City of Grand Junction (3)
Clifton Water District	City of Grand Junction (3)
Colorado Water Utility Council	City of Grand Junction (3)
Ute Water Conservancy	City of Grand Junction (3)
CDPHE	City of Longmont (2)
Longmont Enterprise Technology Services	City of Longmont (2)
Longmont Power & Communication	City of Longmont (2)
University of Colorado	City of Longmont (2)
USEPA	City of Longmont (2)
Boulder County	City of Longmont Public Works & Natural Resources
Colorado Department of Natural Resources	City of Longmont Public Works & Natural Resources
Keep It Clean Partnership	City of Longmont Public Works & Natural Resources
Northern Colorado Water Conservancy District	City of Longmont Public Works & Natural Resources
Big Dry Creek Watershed Association	City of Northglenn
CDPHE WW Permit modeling	City of Northglenn
Rocky Flats Stewardship Council	City of Northglenn
Standley lake Water Quality IGA	City of Northglenn
Upper Clear Creek Watershed Association	City of Northglenn
Woman Creek Reservoir Authority	City of Northglenn
Big Dry Creek Watershed Association	City of Northglenn (2)
Standley Lake Pipeline	City of Northglenn (2)
Standley Lake Water Quality	City of Northglenn (2)
Colorado Nutrient Coalition	City of Pueblo Wastewater Department
Colorado State University - Pueblo	City of Pueblo Wastewater Department
Colorado Wastewater Utility Council	City of Pueblo Wastewater Department
Colorado Water Quality Forum	City of Pueblo Wastewater Department
Councils of Government (Pueblo and Pikes Peak)	City of Pueblo Wastewater Department
Big Dry Creek Watershed Association	City of Westminster

Standley Lake Cities	City of Westminster
Upper Clear Creek Watershed Association and others	City of Westminster
Council of Governments (Pikes Peak Area - Water Quality Committee)	Donala Water & Sanitation District
Pikes Peak Regional Water Authority	Donala Water & Sanitation District
Upper Monument Creek Regional Wastewater Treatment Facility	Donala Water & Sanitation District
CoWARN	Eagle River Water & Sanitation District
mutual aid agreement with Eagle County	Eagle River Water & Sanitation District
Town of Vail (and others) - Stormwater Management	Eagle River Water & Sanitation District
Bear Creek Watershed Association	Evergreen Metro
Contract Operations and Maintenance for other area Districts	Evergreen Metro
Evergreen Park and Recreation District	Evergreen Metro
American Water Works Association	Forest lakes Metro
Colorado Rural Water Association	Forest lakes Metro
Colorado Wastewater Utility Council	Forest lakes Metro
La Plata County	Forest lakes Metro
State of Colorado	Forest lakes Metro
Colorado Division of Water Resources	Greeley Water Pollution Control Facility
Colorado Nutrient Coalition	Greeley Water Pollution Control Facility
Colorado Wastewater Utility Council	Greeley Water Pollution Control Facility
Poudre Monitoring Group	Greeley Water Pollution Control Facility
Rocky Mt. Water Environment Association	Greeley Water Pollution Control Facility
Xcel Energy	Greeley Water Pollution Control Facility
Colorado Nutrient Coalition	Lafayette
Colorado Stormwater Council	Lafayette
Keep It Clean Partnership	Lafayette
Barr/Milton Watershed Association	Littleton/Englewood Wastewater Treatment Plant (1)
Colorado Wastewater Utility Council	Littleton/Englewood Wastewater Treatment Plant (1)
CoWARN	Littleton/Englewood Wastewater Treatment Plant (1)
South Platte Coalition for Urban River Evaluation	Littleton/Englewood Wastewater Treatment Plant (1)
Barr/Milton Watershed Association	Littleton/Englewood Wastewater Treatment Plant (2)
Colorado Wastewater Utility Council	Littleton/Englewood Wastewater Treatment Plant (2)
Colorado Water Quality Forum	Littleton/Englewood Wastewater Treatment Plant (2)
regional plant owned by cities of Littleton and Englewood	Littleton/Englewood Wastewater Treatment Plant (2)
South Platte Coalition for Urban River Evaluation	Littleton/Englewood Wastewater Treatment Plant (2)
Western States Coalition	Littleton/Englewood Wastewater Treatment Plant (2)
work with state work groups on regulatory issues	Littleton/Englewood Wastewater Treatment Plant (2)
City of Steamboat Springs provides wastewater treatment services to Mt. Werner Water	Mt Werner
Mt. Werner provides potable water to City of Steamboat Springs	Mt Werner

Council of Governments (Pikes Peak Area)	Security Water & Sanitation Districts
Fountain Valley Authority	Security Water & Sanitation Districts
Lower Fountain Water Quality Management Association	Security Water & Sanitation Districts
Pikes Peak Regional Water Authority	Security Water & Sanitation Districts
Southern Delivery System	Security Water & Sanitation Districts
Regionalization and Consolidation of Districts	St. Vrain
Shared Service areas	St. Vrain
Working with Municipal Governments	St. Vrain
City of Dacono	St. Vrain (2)
Town of Firestone	St. Vrain (2)
Town of Frederick	St. Vrain (2)
Town of Mead	St. Vrain (2)
Town of Platteville	St. Vrain (2)
Tri-Area Sanitation District	St. Vrain (2)
Fort Lupton Water Treatment	Town of Hudson

*The (2) or (3) next to the utility name indicates a second or third response from a different person at the same utility that sometimes listed different collaborations

COLORADO PHASE 2 INTERVIEW

For each collaborative:

- Basic description of collaboration
    - Key objectives
- Date collaboration officially initiated
- Meeting frequency and mode? (communicate via website/email or meet in person?)
- Financial management
    - how financed/funded?
    - how are costs shared?

General/All

- General outcomes and benefits achieved through collaborations
- Lessons learned:
    - Critical factors leading to success FOR YOUR involvement in these collab.
    - Key challenges/constraints faced by collaborations

    - Any significant roadblocks or barriers others should be aware of?

- Any missed opportunities, areas you feel your utility/others should collaborate in?
- How become involved in these collaborative arrangements?
- Advice for other utilities looking to start up collaborations?