

ABAG Regional Planning Committee Infrastructure Subcommittee Meeting #1

Bay Area Metro Center, San Francisco

July 27, 2016 2:00 p.m. – 4:00 p.m.

Contents of Briefing Packet

- Infrastructure Subcommittee Meeting Agenda
- Participant Biographies
- Background Materials
 - Subcommittee planning and project history
 - Introduction and background
 - Regional water policy issues and Subcommittee objectives
 - Group process and implementation
 - Proposed Subcommittee actions
 - Long-term Stresses to Water Supply
 - Existing Supply
 - Future Supplies
 - Existing Demand
 - Future Demand
 - Appendices
 - Annotated Bibliography of relevant regional, state, and federal documents
 - Water supply infographics
 - City jurisdictions and water and sanitation service area schematic
 - 2016 drought status and Bay Area water sources

ABAG Regional Planning Committee: Infrastructure Subcommittee

Offices of the Association of Bay Area Governments

Bay Area Metro Center

Room 109 (Yerba Buena)

375 Beale Street – San Francisco, CA

July 27, 2016 2:00 p.m. – 4:00 p.m.

Teleconference Locations:

277 Yorkshire Drive New Towns Pennsylvania, PA 18940	STAC Unclassified Conference Room 11370 Peter A McCuen Blvd Rancho Cordova Ca 95660	Napa City Hall, Blue Room 955 School Street Napa, CA 94559
---	---	--

Infrastructure Subcommittee Meeting Agenda

- 2:00 p.m. **Public Comment**
- 2:00 p.m. – 2:20 p.m. **Participant Introductions** (20 minutes)
- What one thing do you hope to accomplish through your participation in this Committee?
- 2:20 p.m. – 2:50 p.m. **Overview and the Subcommittee Charge** (30 minutes)
- ABAG & DHS Infrastructure Protection (15 minutes)
 - Feedback (15 minutes)
- 2:50 p.m. – 2:55 p.m. **The Drought Challenge** (5 minutes)
- 2:55 p.m. – 3:55 p.m. **A Moderated Discussion** (60 minutes)
- A discussion among districts, cities and counties on the regional water supply and infrastructure challenges resulting from California’s drought and projected regional growth:
- **What are the challenges your organization / jurisdiction is unable to address on its own? These may be infrastructural, regulatory, institutional or others.**
 - **How can water-issues be more proactively incorporated with existing local and regional planning instruments? How can local and regional issues be more proactively incorporated with existing water planning instruments?**
 - **Are our current institutional structures sufficiently integrated to meet this challenge?**
- 3:55 p.m. – 4:00 p.m. **Next Steps** (5 minutes)
- Upcoming meetings
 - Action items

Participant Bios

July 27, 2016

ABAG RPC Infrastructure Subcommittee Meeting #1



Barry Anderson is vice president of Electric Distribution at Pacific Gas and Electric Company (PG&E). He is responsible for all maintenance, construction, design, and operation of the electric distribution system. Barry is also the lead for enterprise-wide emergency preparedness and response. Anderson has more than 30 years of experience within the electric utility industry. Prior to joining PG&E, Anderson was senior director of Network Operations for Florida Power & Light Company (FPL), where he previously spent 27 years with increasing responsibilities including transmission and distribution operations, energy procurement and labor negotiations. He received a bachelor's degree in Mechanical Engineering from Michigan State University and his MBA from Nova Southeastern University. Anderson holds a Professional Engineering license and is also certified as a NERC system operator. He is a recent graduate of MIT's Reactor Technology Course for Utility Executives.



Chris Barkley is a professional engineer with 26 years of experience in hazard identification, risk assessment, risk reduction, and disaster response and recovery. He has led risk reduction and hazard mitigation projects for the Federal Emergency Management Agency (FEMA) and state and local government clients in California and across the U.S. He has participated in the San Francisco Planning and Urban Research (SPUR) Resilient City initiative and is the private sector co-chair of San Francisco's Lifelines Council. A resident of San Francisco, he is a vice president and Federal business line leader for AECOM.



Donald Boland is currently the Executive Director for the California Utilities Emergency Association (CUEA), the oldest and largest emergency utility association in California. His position encompasses providing technical, tactical and strategic directions for the membership. As Executive Director, he serves as the single point of contact for the critical infrastructure utilities and the State of California Emergency Management Agency along with other governmental agencies before, during and after an event to facilitate communications, coordination and emergency response. Mr. Boland Chairs the Utilities Operations Center, part of the State Operations Center.



Mark Boucher is a Licensed Professional Engineer with 27+ years of private and public sector experience in land development, transportation, drainage and hydrology. Mark has experience with FEMA flood plains, groundwater, and private and public drainage issues. Mark earned his BS in Civil Engineering and Masters in Engineering from Washington State University and received his Professional Engineering License in 1990. Mark is the Flood Control District representative on Bay Area Integrated Regional Water Management Group committees and the Contra Costa County Council on Homeless. He recently finished his two year term serving as the Chair for the Bay Area Flood Protection Agencies Association.



Allison Brooks is Executive Director of the Bay Area Regional Collaborative. She helps coordinate the major planning and implementation activities of the Bay Area's four regional agencies with a primary focus on advancing successful climate change mitigation and adaptation efforts across the region. The BARC member agencies include the Metropolitan Transportation Commission (MTC), the Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), and the Bay Conservation and Development Commission (BCDC). Allison holds a B.A. in Political Science from the University of California, San Diego (where she also played on the Division III National Championship Tennis Team) and a Masters in Sustainable International Development from the Heller School for Social Policy and Management at Brandeis University. She was a Peace Corps Volunteer in Ghana, West Africa.

Photo not available

Phil Brun joined the City of Napa Public Works Department as an Associate Civil Engineer in December of 1996 and became Water Division General Manager in December of 2002 and is currently the City of Napa Deputy Director of Public Works.



Timothy Burroughs is an Assistant to the City Manager and the Chief Resilience Officer (CRO) for the City of Berkeley. He manages Berkeley's Office of Energy & Sustainable Development and leads the City's efforts to advance readiness for natural disasters and the impacts of climate change. Timothy has over 10 years of experience working to improve urban sustainability.



Norma Camacho is the Interim Chief Executive Officer of the Santa Clara Valley Water District responsible for an operational and capital program at the District of over \$524 million in FY2017. The Santa Clara Valley Water District manages an integrated water resources system that includes the supply of clean, safe water; flood protection; and stewardship of streams for Santa Clara County's 1.9 million residents. Ms. Camacho joined the District in March 2012 as the Chief Operating Officer of Watersheds Operations. She currently serves on the Board of Directors for the National Association of Flood & Stormwater Management Agencies and is a Board member of the American Red Cross of Silicon Valley, Bay Area Council, San Jose Silicon Valley Chamber, San Jose Evergreen Community College Foundation and a member of the Santa Clara City Managers' Association.



Grant Davis is the General Manager of the Sonoma County Water Agency. He is responsible for the Water Agency's core functions of providing drinking water to over 600,000 residents in portions of Sonoma and Marin counties, wastewater management for 60,000 customers, maintaining nearly 100 miles of streams and detention basins for flood protection, and restoring habitat for three federally listed fish species in the Russian River. Mr. Davis and his team are also implementing a renewable energy portfolio that has resulted in a carbon free water supply and distribution system. Prior to joining the Water Agency, Mr. Davis was Executive Director of The Bay Institute, a science-based nonprofit, dedicated to protecting the San Francisco Bay-Delta Watershed and improving water management in California.



Craig Dzedzic, as General Manager of the Bay Area UASI, is responsible for ensuring direct and indirect representation of twelve Bay Area Counties and three major cities to provide region-wide leadership and administration of all grant initiatives regarding Federal Homeland security grants in direct support of the Homeland security strategies. He is responsible for executing regional strategies that align with federal and state policies. For more than twenty years, Mr. Dzedzic has been employed in federal, state, and local government positions. He initially began his career as a legal intern for the Hon. Joseph Biden, US Senator. Thereafter, he moved to San Francisco and became a CA licensed attorney. Mr. Dzedzic earned a BA from American University, School of Int'l Service as well as a JD from Golden Gate University School of Law and a LL.M (tax) from Boston University School of Law.



Amparo Flores is Manager of Integrated Planning at Zone 7 Water Agency in eastern Alameda County and oversees water supply planning and long-term operations, conservation, environmental permitting, and watershed protection. Amparo received her B.S. in Environmental Engineering Science from UC Berkeley, her M.Eng. in Environmental and Water Quality Engineering from MIT, and her Ph.D. in Engineering for Sustainable Development from Cambridge University.



Sarah Gambill currently serves as Chief of Infrastructure Development and Recovery within the Department of Homeland Security's Office of Infrastructure Protection, where she is responsible for developing, coordinating, and supporting the implementation of integrated security and resilience solutions, with a focus on informing infrastructure planning, design, construction and maintenance. Ms. Gambill holds a Bachelor of Arts in Geography and International Relations and Diplomacy from The Ohio State University and a Master of Science in Environmental Planning and Management from the Whiting School of Engineering at Johns Hopkins University. Ms. Gambill is also an active member of Engineers Without Borders, leading water resource development programs in Cameroon and El Salvador.



Juliette Hayes is the Risk Analysis Branch Chief, Mitigation Division in FEMA Region IX. She joined FEMA Region IX in 2003 and was the mitigation planning program lead, where she managed the Pre-Disaster Mitigation Grant Program for the entire region and portions of the Hazard Mitigation Grant Program. Juliette is committed to designing and implementing tailored approaches for building and sustaining partnerships for long term risk reduction in local communities and has explored, identified, and tested regulatory, financial, and grassroots approaches to drive risk reduction at the local community level.

Photo not available

Tracy Hemmeter is a Senior Project Manager for the Santa Clara Valley Water District in San Jose, California. She is responsible for developing and updating the district's Water Supply and Infrastructure Master Plan, which guides investments in securing long-term water supply reliability. She is also leads the district's participation in Integrated Regional Water Management efforts and facilitates the IRWM Roundtable of Regions, an ad hoc coalition of regions from across the state. Her 25 years of experience in water resources management includes working on a variety of groundwater management, water quality, recycled water, and water supply planning issues.

Photo not available

Evermary Hickey is the Director of Emergency Response at PG&E.



Kiran Jain is the Chief Resilience Officer for the City of Oakland. She has experience in both the public and private sectors working on issues affecting the city. Ms. Jain most recently served as Chief Strategy Officer for Neighborly, a venture-backed company modernizing public finance to build the infrastructure people rely on to work, live, and play. Prior to Neighborly, Kiran served as a senior deputy city attorney for the City of Oakland for seven years focusing on land use, urban redevelopment, and municipal governance.



Naomi M. Kelly is the first woman and first African American to serve as City Administrator. In that capacity, she oversees the City's General Service Agency, which consists of 27 City agencies, a budget of nearly three-quarters of a billion dollars and over 2,600 City employees. Ms. Kelly is strongly committed to strengthening the local economy, supporting small businesses and City neighborhoods, ensuring the efficacy of government services, increasing the City's safety and resiliency, and planning for the City's long-term capital and infrastructure needs. She has led numerous critical initiatives throughout her employment with the City, and has been recognized numerous times for her leadership and dedication to public service.



Supervisor **Steve Kinsey** is a fifth term County Supervisor who has been a champion of regional policies that are defining the essential link between transportation and land use. He has also focused on watershed and fishery restoration, sustainable agriculture, fiscally responsible government, the needs of children and families, and has worked closely with communities of color to reduce the barriers to equal opportunity. Supervisor Kinsey serves on the Metropolitan Transportation Commission and is Chair of the California Coastal Commission.



Manisha Kothari is a Project Manager with the Water Resources Division of the San Francisco Public Utilities Commission. Manisha represents the SFPUC in the planning of water reuse projects that the SFPUC is developing through regional partnerships in order to diversify its water supply portfolio and meet future demands. Manisha manages recycled water, potable reuse and desalination programs and has over 15 years of experience in taking projects from concept to implementation

Photo not available

Maureen Martin is a Senior Water Resources Specialist at the Contra Costa Water District where she develops and reviews technical modeling projects, grant applications, environmental documentation, permits and water rights. Water quality and water policy in the Sacramento-San Joaquin Delta are the focus of her work. She graduated from U.C. Berkeley with a Ph.D. in environmental engineering.



Supervisor **Karen Mitchoff** was sworn in as Contra Costa County District IV Supervisor in January of 2011. She began her service to the County in the office of former Sherriff-Coroner Richard Rainey. She also worked as a fiscal and administrative analyst for the county's Employment and Human Services Department, and as Chief of Staff for former Supervisors Sunne Wright McPeak and Mark DeSaulnier. Karen served on the Pleasant Hill City Council from 2008 to 2010, and as Mayor in 2010. Karen was appointed to the Pleasant Hill Recreation and Park District Board of Directors in 2003 and was elected to that Board in 2004 and 2006. She served as Chair in 2005 and 2006, and served on a variety of committees during her tenure there.



Patrick Otellini is the Chief Resilience Officer (CRO) for the City and County of San Francisco tasked with implementing the city's resilience strategy – Resilient San Francisco - Stronger Today, Stronger Tomorrow. This strategy was developed in conjunction with the 100 Resilient Cities initiative pioneered by the Rockefeller Foundation. Mr. Otellini was originally appointed by Mayor Ed Lee in October of 2012 as the Director of San Francisco's Earthquake Safety Implementation Program and continues to oversee this program as the Director of the newly formed Office of Resilience and Recovery. Prior to his appointment Mr. Otellini was a Senior Associate with A.R. Sanchez-Corea & Associates where his work included the management of the permit and inspection process for over \$5 Billion worth of construction in San Francisco.



Julie Pierce is a Council Member in the City of Clayton and is the President of the Association of Bay Area Governments (ABAG) and the ABAG delegate to the Metropolitan Transportation Commission. On the state level, Julie is the immediate past president of the California Association of Councils of Governments (CALCOG) where she represents the Contra Costa Transportation Authority (CCTA). She has been working on transportation, land use and growth management policy issues for nearly 30 years. She has served five times as Mayor of Clayton, and three times as Chair of CCTA.



Cecile Pinto is the Manager for the Pacific Gas and Electric Company, Emergency Preparedness and Response Support Department. With over 25 years of experience in Emergency Management, Cecile is responsible for leading emergency preparedness initiatives across the PG&E enterprise, including both gas and electric system operations. Prior to PG&E, Cecile held various leadership positions within State Government, including the Governor’s Office of Emergency Services where she was the Regional Director of the Cal OES Coastal Region, with Cal-Fire as a Fire Apparatus Engineer, and with the California Conservation Corps as a Conservationist and Regional Administrative Officer. Cecile is the PG&E Company representative for the Lifelines groups, working closely with both the San Francisco and Southern California Lifelines groups. She has served as subject matter expert to other utilities that are developing similar infrastructure or Lifelines working groups throughout the US.



Steven Ritchie is Assistant General Manager of the Water Enterprise, responsible for overseeing water system operations and planning from Hetch Hetchy through the Regional Water System to the City Distribution Division and the management of lands and natural resources. Steve was the Manager of Planning from 1995 to 1998. Prior to his current assignment, he managed the South Bay Salt Pond Restoration Project, a multi-agency effort to restore 15,100 acres of valuable habitat in South San Francisco Bay, while providing for flood risk management and public access. Steve has worked at management positions at the San Francisco Bay Regional Water Quality Control Board (1987-1995), the CalFed Bay-Delta Program (1998-2000), and URS consultants (2000-2004). He has a B.S. and M.S. in Civil Engineering from Stanford University.



Kerrie Romanow is director of San José Environmental Services Department. Ms. Romanow leads a talented team of 530 employees who manage solid waste collection and recycling; watershed protection and pollution prevention; municipal drinking water; community sustainability initiatives, and the operation of the award-winning San Jose-Santa Clara Regional Wastewater Facility and its South Bay Water Recycling operation. An accomplishment under Ms. Romanow’s leadership includes combating the unprecedented drought with an inventive pilot “Lawn Busters” program, overhauling lawns to drought tolerant landscaping.



Catherine Spaulding serves as the Assistant General Manager of the Bay Area UASI. She is responsible for providing region-wide leadership and administration of all grant initiatives. Her work includes strategic planning and programmatic priority-setting; risk management; systems for grants monitoring and reporting, compliance, and performance management; as well as organizational structure and staff development. Prior to her work with the Bay Area UASI, Catherine Spaulding worked for the Controller's Office of the City and County of San Francisco and the World Bank.



Linda Seifert represents District 2 on the Solano County Board of Supervisors. Elected in June 2008 and 2012, she will serve through 2016. She values investment in education as a primary tool to building stronger communities that entice businesses to settle in Solano. She is committed to ensuring that health and social services are available to the very young and seniors in our community. Before representing District 2, she was the first woman partner at the firm of McNamara Law Firm in Walnut Creek (1985-1997). In 1997, she joined the staff of the California Dental Association, a large health care non-profit located in Sacramento, as General Counsel. She serves on dozens of boards including the ABAG Executive Board, and the Solano County Water Agency Board.



Weston Starbird joined the San Jose Mayor's Office as a Policy Analyst in February of 2015. He is a graduate of University of California, Davis, where he received a Bachelor's of Arts in History. Prior to joining the Mayor's Office, Weston was an intern at the California Department of Education.



Jill Techel is the Mayor of Napa. Her first official position was as an appointee to the Napa Parks and Recreation Commission, and she later became the first female chairperson for that group. She was later elected to the Napa Valley Unified School District Board, serving a total of six years, including three years as President. In 1996, Jill was appointed to fill a City Council vacancy, and after completing that term, was elected for two four-year terms on the Council. Jill was elected Mayor of Napa in March 2005, ran unopposed for a second term in November 2008, and was elected to a third term in 2012. Mayor Techel represents the City as the delegate to the Association of Bay Area Governments (ABAG), as the Chair of the Napa County Flood Control and Water Conservation District, as a Board member of the Napa County Transportation and Planning Agency (NCTPA), and Napa Sanitation District.



Mike Tognolini is the Manager of Water Supply Improvements for EBMUD. In that role, he is responsible for the development of supplemental water supplies to meet drought needs, including water transfers, groundwater banking, brackish water desalination, and recycled water. Mike is also responsible for regional water supply projects for EBMUD, including overseeing the development of the Bay Area Regional Reliability (BARR) Project, a collaboration between eight Bay Area water agencies to improve regional water supply reliability. Mike also serves as the Authority Manager for the DSRSD/EBMUD Recycled Water Authority (DERWA) which produces recycled water for Dublin, San Ramon, and Pleasanton.



Dyan Whyte serves as the San Francisco Bay Regional Water Quality Control Board's Assistant Executive Officer. She oversees the day to day operations of the agency and serves as the lead prosecutor for enforcement cases. Ms. Whyte began her State service career at the North Coast Regional Water Quality Control Board in 1986 and transferred to the San Francisco Bay Regional Water Quality Control Board in 1988. Over the years she has managed a variety of surface and groundwater programs and developed numerous plan, policies, and regulations addressing emerging water quality concerns.



Jim Wollbrinck is the Manager of Security and Business Resiliency for San Jose Water Company. He is responsible for all aspects of Emergency Management, developing Security Policies/Procedures; and Business Continuity Management for San Jose Water Company. He has 28 years of operational and management experience in the water industry. Mr. Wollbrinck is a graduate of USF with a B.S. in Applied Economics and holds a Grade 3 Water Treatment Operator Certification through the California Department of Public Health and is a Senior Member of the American Society for Quality.



Merideth Secor is a strategy and policy analyst at the US Department of Homeland Security, Office of Infrastructure Protection. She has eight years of experience in federal government policy-making, strategic planning, risk management, private sector consulting, and international affairs. Merideth has an M.A in International Relations from Johns Hopkins University and a B.A. in Global Affairs from George Mason University.



Jodi Van Horne, ABSG Consulting, is a subject matter expert in emergency management and response processes, continuity of operations, and continuity of government, critical infrastructure protection, and mass evacuation behaviors currently supporting the DHS NPPD Office of Infrastructure Protection. She has over 10 years of emergency management experiences at the Federal, State, and local level along with an emergency response background covering 17 years total at the local level in both volunteer and career departments across the urban, suburban, and rural environments.



Edgar Castor, is a Protective Security Advisor at the US Department of Homeland Security, Office of Infrastructure Protection. Edgar serves as Regional Resiliency Assessment Program Federal Team Leader, Critical Infrastructure/Key Resources Vulnerability Specialist and liaison to federal agencies, State and local governments, and private sector partners, in coordination of multi-sector Regional Resiliency and Vulnerability Assessments



Ezra Rapport is the Executive Director of the Association of Bay Area Governments. He provides oversight and supervision of ABAG's planning and service programs, and serves as liaison to the region's city, town, and county managers and administrators. Ezra Rapport brings strong leadership and recognized expertise in municipal management, governmental operations, land use, and transportation to ABAG and is committed to advancing regional collaboration among Bay Area counties, cities, and towns. In his public and private service career, he was Deputy City Attorney and Assistant City Manager for the City of Oakland and served as Principal Consultant for the California Senate Select Committee on Bay Area Transportation. He was manager of the DeSilva Group land development division and prior to ABAG was the Chief Operating and Development Officer for the City of New Orleans recovery operations.



Miriam Chion is ABAG's Planning and Research Director, and has been with the Association since 2009. Miriam has been a leader in the development of the Sustainable Communities Strategy, working closely with ABAG's planning and research staff and consultants on ABAG's economic and planning forecasts. She has demonstrated special skills in managing staff, communicating with elected officials, and maintaining ABAG's role with other agencies in this complex inter-governmental process. Prior to joining ABAG, Miriam was an Assistant Professor of Community Development and Planning at Clark University. She has an expertise in community and regional development, strengthened by her research work in the United States and Latin America, comparing dissimilar communities that share similar challenges, and by her professional work as senior planning manager for the San Francisco Planning Department.



Duane Bay joined ABAG in September 2013 with a focus on affordable housing, the Regional Housing Need Allocation, and overall housing policy. Duane came to ABAG with an extensive background in housing planning that includes serving as the Director of the San Mateo County Department of Housing from 2005 to 2013. He was also a Councilmember and Mayor for the city of East Palo Alto. He manages ABAG's Resilience Program.



Caitlin Sweeney is the director of the San Francisco Estuary Partnership, and manages overall program direction and SFEP staff. Caitlin joined the Estuary Partnership in 2011 and was promoted to Director in 2015. She developed the Partnership's Watershed Program and has overseen various multi-partner collaborative projects on watershed management, wetland restoration, and climate adaptation and resiliency. In addition, Caitlin led the most recent revision of the Comprehensive Conservation and Development Plan, the collaborative blueprint for the future of the Estuary. Prior to coming to the Partnership she spent twelve years at the San Francisco Bay Conservation and Development Commission, as a planner and ultimately as Chief Deputy Director. During her tenure, she developed enforceable policies on natural resources and sustainable development. Caitlin has a B.A. in Biological and Environmental Studies from Mills College, and a Master's in Marine Affairs from the University of Washington.



Arrietta Chakos is a public policy advisor on urban resilience, specializing in community resilience strategies and multi-sectoral engagement. Her work with the Association of Bay Area Governments focuses on resilience planning the S.F. Bay Area. The regional program focuses on development of common resilience policies and implementation measures sponsored by the Federal Emergency Management Agency and the 100 Resilient Cities Initiative launched by the Rockefeller Foundation. She advises the City and County of San Francisco on resilience policies and coordination on regional issues. Ms. Chakos chairs the Committee on Leadership for Integrated Planning at the National Academies of Science. She serves as an appointed member on the Resilience Roundtable and the Committee to Advise the U.S. Global Change Research Program at the Academies. She chairs the Housner Fellow committee at the Earthquake Engineering Research Institute. Ms. Chakos served as research director at the Harvard Kennedy School's Acting in Time Advance Recovery Project. She worked in local government for 18 years to direct innovative risk mitigation initiatives, intergovernmental coordination, and multi-institutional negotiations at the City of Berkeley, California.



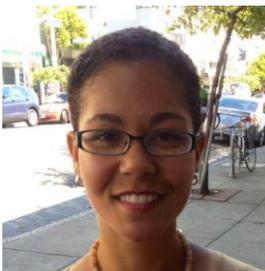
Darcie Luce is an Environmental Planner for the San Francisco Estuary Partnership (SFEP), and oversees the implementation of water-focused actions in the Comprehensive Conservation and Management Plan and assists with management of IRWMP-related projects. In addition to her work with the SFEP, Darcie is a Water Policy Specialist for Friends of the San Francisco Estuary. Before joining the Partnership and Friends, Darcie was Assistant Director of the California Land Stewardship Institute, managing creek and watershed restoration projects and a water quality certification program for farmers. Darcie has a master's degree in applied anthropology with an environmental focus from the University of Maryland at College Park.



Michael Germeraad is a resilience planner for the Association of Bay Area Governments (ABAG). At ABAG he supports Bay Area cities with hazard mitigation, climate adaptation, and resilience planning efforts. His work at ABAG and his past research have focused on infrastructure vulnerability assessments and connecting sustainability and resilience policies. He received a B.S. in Structural Engineering from UC San Diego and a Masters in Civil Engineering as well as City & Regional Planning at Cal Poly San Luis Obispo.



Asavari Devadiga works with the Association of Bay Area Governments as part of the Resilience Team. Her primary area of work is infrastructure service and delivery and urban & environmental planning. Asavari has a strong interdisciplinary background in environmental science and planning, policy, and law, and in wastewater engineering and environmental pollution control technology. In her work experience of over 14 years in environmental consulting, Asavari has worked - both as project manager and technical lead - on a large diversity of infrastructure and urban planning projects with a focus on water and wastewater and related infrastructure and regulatory areas in the Bay Area. Asavari recently completed her Ph.D. at University of California Berkeley, where her doctoral research centered on water infrastructure service and delivery, institutional framework and challenges, and intersections of urban planning and infrastructure development. Her research interests and experience also span hydrology and water quality assessments; sustainability planning; and resilience in infrastructure service and institutions.



Natasha Dunn works with the Association of Bay Area Governments as part of the Resilience Team. She is currently looking at regional collaboration strategies for cities and counties to work with utilities on building resilience in water infrastructure. She holds a B.S. in Environmental Studies, Natural Resource Management from San Francisco State University and an M.S. in Water Resource Management from Fresno State University.

Background Materials

- **Subcommittee Planning and Project History**
- **Long-term Stresses to Water Supply**
- **Appendices**

Subcommittee Planning & Project History

- Purpose of Subcommittee
- Introduction and background
- Regional water policy issues and Subcommittee objectives
- Group process & implementation
- Proposed Subcommittee actions

Purpose of the Subcommittee

Plan and execute collaborative steps toward improving and sustaining reliable water supply and distribution in the Bay Area. With support from invited stakeholders, determine a best path forward for connecting existing water supply planning with local and regional planning initiatives.

The Subcommittee will be a convening space for other regionally significant infrastructure challenges (energy assurance, fuel reliability, etc). In 2016 the Subcommittee will concentrate on reliable water supply and distribution.

Introduction and Background

This effort is funded by the Federal Emergency Management Agency (FEMA) and continues the call from ABAG's 2015 General Assembly for the convening of cities and water districts to move the region toward regional resilience. ABAG will implement this work in coordination with the federal DHS Office of Infrastructure Protection.

ABAG as a convener

ABAG's mission is to strengthen cooperation and collaboration among local governments to provide innovative and cost effective solutions to common problems. The Association is committed to addressing sustainability, resilience and equity in the region, and leads regional housing, economic development and infrastructure planning efforts.

In 2014, ABAG's Executive Board and Regional Planning Committee supported the formation of a Regional Lifelines Council to address vulnerabilities in the region's infrastructure systems. Water is a vital natural and urban resource that intersects challenging governance and coordination obstacles. Through this initiative, ABAG seeks to complement current regional efforts by

convening a collaborative process to deepen the discussion of how the urban development process can tie into water supply planning and water resilience efforts at the regional level.

ABAG's Regional Planning Committee (RPC) provides advice and counsel to the Executive Board on matters related to the preparation and implementation of the Regional Plan for the San Francisco Bay Area. Components of the plan include economic development, housing, and infrastructure planning. The RPC Infrastructure Subcommittee provides the foundation for this initiative.

ABAG's partnership with the Department of Homeland Security Office of Infrastructure Protection

The DHS Office of Infrastructure Protection leads and coordinates national programs and policies on critical infrastructure security and resilience and has established strong partnerships across all levels of government and the private sector. Their mission is to lead the national effort to secure critical infrastructure from all hazards by managing risk and enhancing resilience through collaboration with the critical infrastructure community. To achieve this, the office conducts and facilitates vulnerability and consequence assessments to help critical infrastructure owners and operators and State, local, tribal, and territorial partners understand and address risks to critical infrastructure. Infrastructure Protection provides information on emerging threats and hazards so that appropriate actions can be taken. The office also offers tools and training to partners to help them manage the risks to their assets, systems, and networks.

The *National Infrastructure Protection Plan: Partnering for Critical Infrastructure Security and Resilience* (NIPP), updated in 2013, outlines how government and private sector participants in the critical infrastructure community work together to manage risks and achieve security and resilience outcomes. The NIPP calls on the critical infrastructure community to find ways to empower local and regional partnerships in order to build capacity nationally to address infrastructure challenges. The work of the RPC Infrastructure Subcommittee is intended to both directly support the Bay Area and be used as a case study for how other regions can band together to plan for infrastructure and address challenges within their communities.

Problem and Objective

What problem will the group address?

The problem is two-fold:

- Future challenges for water service:
 - Plan Bay Area 2040 projects an increase in the region's population by 2.1 million to 9.3 million. This growth raises serious concerns about both whether there are adequate water supplies to meet the increasing demand, and whether we have reliable infrastructure systems to deliver the service we need.
 - Disruption of water systems during an earthquake could interrupt service to millions of Bay Area residents for months. It is unclear whether service could or would be restored expediently.
- Fragmentation of governance and decision making:
 - The urban planning and water supply planning processes continue to run in parallel but with limited coordination among firms and jurisdictions. Similarly, the ad hoc interactions among water and city planning agencies lead to inefficient coordination in the nine county area.
 - Any adaptive implementation to the region's water challenges will require coordination across fragmented responsibilities of cities, counties, and a variety of water supply, conservation, flood control, natural resource protection, and sanitation districts and agencies.

What is the Subcommittee's objective?

Create a more effective path to achieve Bay Area water resilience. The Subcommittee can provide the foundation for an ongoing regional collaborative process identifying actions and measures at the various governance levels. ABAG seeks to strengthen current regional planning by convening stakeholders who can deepen the discussion of how Bay Area development is linked to water supply planning and water resilience efforts.

The Subcommittee will:

- Share ideas on how local and regional collaboration could support a broader set of resilience solutions and approaches.

- Identify opportunities where Subcommittee members can collaborate and share information among the supply and demand networks, among districts and jurisdictions, and among urban planning and development bodies.
- Understand and address local infrastructural, regulatory, institutional or other challenges that impede water resilience. Determine which challenges call for active collaboration among the group's stakeholders.
- Provide input into Plan Bay Area.
- Advise ABAG's Executive Board on specific program or legislative initiatives.

Group Process and Implementation

The Subcommittee can use existing knowledge and resources in specific discussions on achieving water resilience planning in the Bay Area. Three Subcommittee meetings of moderated discussion act to initiate and facilitate a regional collaborative process that will culminate with a symposium and water resilience study. The study, proposed actions, and defined future coordination with water districts will be presented to the Regional Planning Committee and ABAG Executive Board. Similarly the Department of Homeland Security Office of Infrastructure Protection and FEMA Region IX will be briefed on the Subcommittee actions and next coordination steps. These final milestones will mark a foundation for continued regional collaboration between utilities and local governments focused on collective resilience action.

In addition to ABAG led events there are many other events that will inform our process. These events are not associated with the RPC Infrastructure Subcommittee, but their missions are complementary. If there are other events members should be made aware of, please inform ABAG staff.

Project Team

The project team consists of ABAG RPC Infrastructure Subcommittee Chair and Department of Homeland Security Infrastructure Protection Assistance staff members, along with ABAG Resilience Program staff. The team has arranged meetings with local water experts from non-profit and academic institutions to support the materials generated for the Subcommittee, as well as the eventual study.

ABAG led process (2016)

RPC Infrastructure Subcommittee #1

Wednesday, July 27 (2:00p-4:00p)

We'll start off with an introduction to the process, providing an opportunity for the group to make suggestions. We'll then refocus with drought and future water supply challenges as a lens to discuss needed collaboration and action.

RPC Infrastructure Subcommittee #2

Wednesday, Sept 14 (9:30a-11:30a)

Building off of the first meeting, and subsequent ABAG & DHS-IP staff work, we'll continue the discussion on local and regional collaboration and use water distribution following a scenario earthquake to frame the discussion.

RPC Infrastructure Subcommittee #3

Wednesday, October 12 (2:00p-4:00p)

The conversation will shift from dialogue to a discussion of collaborative actions by cities, counties, water districts, ABAG, state agencies, and federal partners. The next steps for this group will also be discussed.

Bay Area Water Resilience Study

Late October, 2016

ABAG & DHS-IP staff will produce a short report which synthesizes information produced for and emanating from the RPC subcommittee meetings.

Resilient Water Systems Symposium

Thursday, November 10 (1:00p - 6:00p)

The Subcommittee process is limited by the number of people we can fit around a single table. Other water districts, cities, counties, and subject matter experts and advocates will want to be a part of the process. We'll broaden the circle with a half-day symposium to share the subcommittee's proposed direction.

Present to ABAG Boards and Partners

TBD (December & January)

ABAG staff will present to the Regional Planning Committee in December, and the ABAG Executive Board in January. Additionally, both FEMA Region IX and DHS Infrastructure Protection will be briefed on next coordination steps.

Relevant outside events (2016)

SF Bay Water Equity Summit

Tuesday, July 26 (10:00a-3:30a)

Will bring together water decision-makers with community and advocacy groups to discuss how the drought has affected disadvantaged communities in the Bay Area.

Organized by Pacific Institute & Environmental Justice Coalition for Water.

Yellow Command Exercise

Thursday, September 8 (9:00a-3:00p)

Offices of Emergency Management will tabletop an earthquake scenario that damages water systems across the region. As part of the exercise, staff will demonstrate large scale temporary water distribution centers.

Organized by Bay Area Urban Areas Security Initiative.

Fall Water Workshop

Fall 2016 (TBD)

Building off of a May 23rd event, SSV will bring back together utilities, Silicon Valley businesses, developers, water reuse installers, and city/county planners to continue discussion on resilience and water reuse.

Organized by Sustainable Silicon Valley

Bay Area Regional Reliability

Ongoing Process 2015 - 2020

Eight of the largest water districts in the Bay Area are working together to develop a regional solution to improve water supply reliability for their combined service area.

<http://www.bayareareliability.com/>

Others?

Is there an event or process this group should be aware of.

Long-term Stresses to Water Supply

The recent drought and the projected future conditions suggest change is needed to maintain the region’s high water quality and reliability. To efficiently achieve a reliable equilibrium between supply and demand, stakeholders must coordinate on strategies to address:

- Existing water supply – the water sources we use today.
- New water supply – the water sources we could add to the portfolio in the future.
- Existing demand – the draw from residents, businesses, and industries that use water today.
- New demand – the draw from new residents and businesses that will be located here in the future.
- Roles in supply and demand.

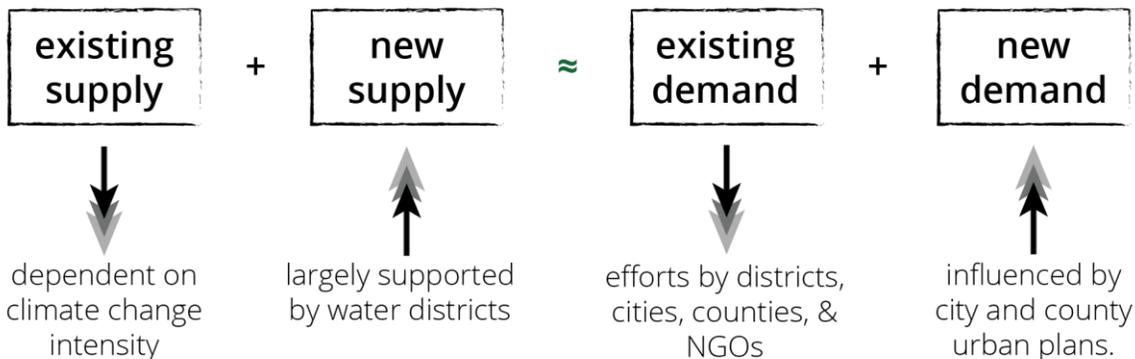
With a unified resilient water systems vision, regional stakeholders can leverage their common resources to best purpose for the Bay Area.

Today
 supply ≈ demand

Future* (w/o action)
 supply ≠ demand

* future likely being decades in the future

Future (w/ action)
 supply ≈ demand



Existing Supply

The Department of Water Resources has succinctly summarized climate change impacts on water:

“Climate change is having a profound impact on California water resources, as evidenced by changes in snowpack, sea level, and river flows. These changes are expected to continue in the future and more of our precipitation will likely fall as rain instead of snow. This potential change in weather patterns will exacerbate flood risks and add additional challenges for water supply reliability.

The mountain snowpack provides as much as a third of California's water supply by accumulating snow during our wet winters and releasing it slowly when we need it during our dry springs and summers. Warmer temperatures will cause what snow we do get to melt faster and earlier, making it more difficult to store and use. By the end of this century, the Sierra snowpack is projected to experience a 48-65 percent loss from the historical April 1st average. This loss of snowpack means less water will be available for Californians to use.

Climate change is also expected to result in more variable weather patterns throughout California. More variability can lead to longer and more severe droughts. In addition, the sea level will continue to rise threatening the sustainability of the Sacramento-San Joaquin Delta, the heart of the California water supply system and the source of water for 25 million Californians and millions of acres of prime farmland.” (DWR, 2016)

Bay Area imported water supplies from the State Water Project, Central Valley Water Project, Hetch Hetchy Regional Water System, and the Mokelumne River Watershed will each be impacted by reduced snowpack and greater weather pattern variability. The Bay Area's existing water supply system is likely to be less reliable in the 21st century than it was in the 20th.

Future Supply

The past five years is the state's third 3+ year drought over the past three decades. Other droughts and sustained local leadership have pushed districts to pursue new sources of supply. When identifying sources of new water supply, many focus on the following sources:

Groundwater – Agencies are looking at both previously untapped groundwater supplies, and replenishing existing aquifers. Many districts with existing large groundwater basins are expanding *conjunctive use*, a strategy to manage surface water and groundwater supplies together: aquifers are used to store water in wet years and then are drawn down

in dry years. Other districts that have never used groundwater as part of their supply portfolio have groundwater exploration projects, even to add a very small additional amount of water.

Recycled Water – Across the region, districts are launching and expanding recycled water projects. Many variations of recycled water in the region are being used for industrial uses, irrigation, non-potable indoor uses, and as a resource to replenish aquifers. In addition to *non-potable reuses*, *potable reuse* is being considered at both a large scale and individual building scale.

Rainwater Harvesting – Whether it is the expansion of existing central reservoirs, or distributed 150 gallon rain barrels, rain water harvesting is a tactic that provides a winter water source and reduces flood potential downstream.

Desalination – Previous examples have widespread support; these are often viewed as sources to tap ahead of desalination which prompts energy consumption concerns and environmental impact concerns due to brine disposal. It is nonetheless a potential source of future water supply.

Water supply districts/agencies are largely those pursuing new supply sources. In many cases, in particular with recycled water projects, the water supply districts are coordinating directly on a project basis with cities, large water consumers, and sanitation districts.

Existing Demand

After a strong economic recovery, in 2013 there were 7.1 million residents in the nine-county Bay Area region. In our heavily urbanized region, residential use makes up a large portion of the existing water demand, with businesses, industry, and local agriculture rounding out the categories of urban water uses. In order to maintain the natural resources in the region other water is released to meet environmental needs.

Historically per capita water demand has shrunk each decade, with large downward spikes during droughts that rebound after wet years. In past droughts when water supply was a large concern, urban water ratcheted up conservation as much as a quarter of their previous average demand. In the summer of 2015 at the height of the current drought, the Bay Area Hydrologic Region reduced consumption by as much as 32% (Water Boards, 2016). Some conservation measures result in continued conservation gains while others rebound when the messaging and surcharges are removed.

Future Demand

By 2040, ABAG forecasts the region will grow to 9.3 million residents which will demand an additional 660,000 new housing units. With the addition of 1.8 million more residents, jobs are forecast to grow by 1.1 million (Plan Bay Area, 2013).

This new growth will be subject to any existing state and local codes which will influence the per capita demand of new development. Plan Bay Area, the regional transportation and land use plan, calls for the future development to be centered in Priority Development Areas, near high frequency transit options. In many cases the new construction across many Bay Area cities will occur at a higher density, than existed historically in the region.

Roles in Water Supply and Demand

Water Supply

As seen in Appendix A, many different stakeholders are involved in the supply, treatment, and distribution of water supply. Two thirds of the region's supply comes from four sources managed by four agencies, the Sacramento River Watershed (State Water Project | DWR), San Joaquin River Watershed (Central Valley Water Project | US Bureau of Reclamation), Tuolumne River Watershed (Hetch Hetchy Regional System | SFPUC), and the Mokelumne River Watershed (EBMUD), with one-third of the region's supply locally collected and tapped by local water districts, or by cities with municipal water departments. Some cities do not operate any water supply system, relying solely on one or many water districts for different elements of supply and delivery. Other cities receive their water wholesale and then distribute to residents and customers. A large portion of Bay Area water supply and transmission is outside the hands of cities and counties.

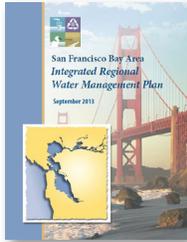
Water Demand

Water demand is an element that is influenced by a wide range of stakeholders in many different ways. Water districts, cities, counties, non-profits, and community groups have all played substantial roles in conserving water and promoting water efficiency. All the above have some level of *conservation program*, whether it is messaging and education to the community, or robust incentive and resource programs to incorporate water efficiency technology and management.

A variety of cities, counties, districts, and the state are using codes and standards to require new development or existing buildings at point-of-sale to incorporate water efficient fixtures and landscapes. Across the region, as with many codes and standards, there are varying standard levels.

Appendix A – Annotated Bibliography: Relevant Regional, State, and Federal Documents

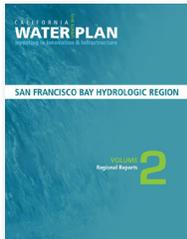
This list includes a range of documents the project staff is using to help frame the Subcommittee meetings as well as the Water Resilience Study. If there are other resources you recommend the team incorporate please contact Michael Germeraad (ABAG) michaelg@abag.ca.gov with recommendations.



Bay Area Integrated Regional Water Management Plan (IRWMP)

The plan which combines water supply, water quality, wastewater, recycled water, flood protection, stormwater management, watershed management, and habitat protection developed five goals with many sub-objectives. The five goals are: (1) promote environmental, economic, and social sustainability, (2) improve water supply reliability and quality, (3) protect and improve watershed health and function and Bay water quality, (4) improve regional flood management, (5) create, protect, and maintain environmental resources and habitats.

Details: Published 2013 by 19 Bay Area Districts & Agencies, 973 pages.



California Water Plan - San Francisco Bay Hydrologic Region

The plan, which folds into the statewide document, outlines the current and future status of water in the state, touching on water supply, quality, flood management, and resource and habitat restoration. The plan recommends many goals and strategies for the state -- a subset of that list includes: improved flood management, reduced water demand, increased water supply, and improved water quality. The Plan recognizes the IRWMP as having a similar vision and points out the many positive accomplishments achieved within the region.

Details: Published 2013 by Department of Water Resources & Natural Resources Agency, 118 pages.



Future Proof Water

The plan used Urban Water Management Plans from 11 of the region's largest districts to support a regional vision for water supply. Recommendations in the plan include: developing supply scenarios that include climate variability assumptions, evaluating the vulnerability of the delivery systems to earthquakes, prioritizing efficiency and conservation best practices, requiring new development to be highly efficient, and phased last, prioritize development of new supplies in the following order: conjunctive groundwater use, recycled water, and desalination.

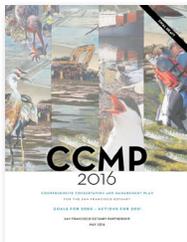
Details: Published 2013 by SPUR, 36 pages.



2015 Spring General Assembly: A Vision for a Water Transformation

The General Assembly, held annually, brings together delegates from each city and county in the Bay Area region. In 2015, David Sedlak (UC Berkeley) gave a keynote talk titled where he outlined a sample vision for transforming the Bay Area water system over 35 years. In his talk he discussed the need to conserve 25% of existing supply, expand water reuse, and consider desalination later on. He ended his keynote with a call for the region to convene water districts and cities in 2016 to align visions to ensure the Bay Area has a 21st century water system.

Details: Keynote Presentation by David Sedlak (UC Berkeley) 2015, 11 slides.



Comprehensive Conservation Management Plan

The Plan, a Clean Water Act requirement, streamlines 40 priority actions and aligns them with challenges outlined in the 2015 State of the Estuary report. The 40 priority actions are organized into four large goals: (1) sustain and improve habitats and living resources of the estuary, (2) increase the resilience of the estuary to sustain functions in the face of changing climate conditions, (3) improve water quality and increase water quantity to the estuary, (4) champion the estuary.

Details: Draft Published 2016 by San Francisco Estuary Partnership, 80 pages.



Plan Bay Area: Strategy for a Sustainable Region

The Plan is a long-range transportation and land-use strategy. Working with cities and counties, the Plan advances initiatives to expand housing and transportation choices, create healthier communities, and build a stronger regional economy. The plan projects the region to grow from 7.1 to 9.5 million residents by 2040 and provides a strategy for aligning the region's future housing needs in priority development areas which are walking distance to frequent transit service. The plan specifies how \$292 billion in transportation funds will be spent through 2040.

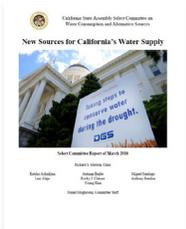
Details: Published 2013 by Association of Bay Area Governments & MTC, 108 pages.



White House Water Summit - Presidential Memorandum & Federal Action Plan

As a part of the Summit, the White House issued a Presidential Memorandum and a Federal Action Plan for Long-Term Drought Resilience. The Memorandum outlines the Federal policy to coordinate and use applicable federal investments, assets, and expertise to promote drought resilience and complement drought preparedness, planning, and implementation efforts of State, regional, tribal, and local institutions, and to seek partnerships with such institutions and the private sector to increase, diversify, and increase access to water resources.

Details: Published 2016 by White House; Memorandum, 9 pages; Action Plan, 20 pages.



Select Committee Report: New Sources for California's Water Supply

A Select Committee chaired by Assemblymember Gordon (District 24) held three hearings in 2015 and 2016, bringing in a dozen water experts from across the globe to provide their perspective on ensuring a reliable water supply for the state. Recognizing the agreement that there is still lots of room for aggressive conservation and that should be the first step, the panel largely focused on secondary steps the state will have to take to expand and diversify its water sources in a way that recognizes future climate change challenges.

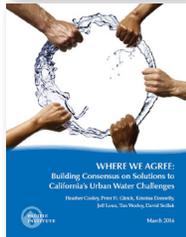
Details: Published 2016 by CA Assembly Committee: Water Consumption & Alternative Sources, 61 pages.



Water and the California Economy

California's water systems are owned, operated, and maintained by every level of government. Using water management costs, it has become clear local agencies will be responsible for the development and financing of tomorrow's water solutions. PPIC's Water and the California Economy publication reported local agencies were responsible for 89.5% of the annual water management expenditures in 2009. Unlike flood control agencies which don't have a reliable mechanism to finance investments, water districts have been successful in funding change.

Details: Published 2012 by Public Policy Institute of California, 32 pages.



Where We Agree: Building Consensus on Solutions to California's Urban Water Challenges

Water utilities, water utility associations, academia, and NGOs were convened in a series of workshops to discuss urban water use and where there was consensus for specific strategies. The workshop drilled down into consensus around specific actions. The workshop focused on actions related to water conservation and efficiency, water recycling and reuse, stormwater capture, drought planning, financing water systems, watersheds and integrated water management, and lastly water storage.

Details: Published 2016 by Pacific Institute w/ support from 3 other institutions, 23 pages.



Water Resilience Summit: Summary & Next Steps

At the Summit, key municipal and federal agency leaders convened for a two-day discussion to examine the array of challenges facing utilities in light of climate change and, more importantly, to outline the policy and advocacy steps and collaborative actions that could be taken to improve resilience. The three themes explored at the summit were (1) resilience, risk tolerance, and long-term planning, (2) constraints to and collaborations for building local utility resilience, (3) financing, funding, and partnering for resilience.

Details: Draft Published 2014 by National Association of Clean Water Agencies, 14 pages.



Water Sector Resilience: Final Report & Recommendations

The National Infrastructure Advisory Council (NIAC) provides the President of the United States with advice on the security and resilience of the critical infrastructure sectors and their functional systems, physical assets, and cyber networks. The National Infrastructure Advisory Council (NIAC) was asked to 1) assess security and resilience in the Water Sector, 2) uncover key water resilience issues, and 3) identify potential opportunities to address these issues.

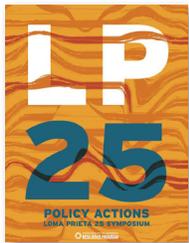
Details: Draft Published 2016 by National Infrastructure Advisory Council, 212 pages.



Regional Resilience Initiative: Policy Agenda for Recovery

The Policy Agenda identifies sector-specific recovery issues that may require jurisdictional coordination and collaboration. The document aims to develop a sustainable process through which stakeholders in the Bay Area can progressively build resilience through collaborative planning for longterm disaster recovery. The report explores how Bay Area leaders can work together to plan for and address the impacts of a major Bay Area disaster. The report focuses on four policy topics: governance, housing, infrastructure, and economy and business.

Details: Published 2013 by Association of Bay Area Governments, 86 pages.



Loma Prieta 25 Symposium Policy Actions

The document highlights the four policy goals endorsed by the ABAG Regional Planning Committee and Executive Board to address seismic safety in the Bay Area. The policies, developed by the LP25 steering committee and informed by the Northridge 20 symposium (January 2014), were showcased at the October 16, 2014 Loma Prieta 25 Symposium. The four policies include, (1) update building codes, (2) upgrade vulnerable apartments and condominiums, (3) develop financial incentives, and (4) convene lifeline providers and cities.

Details: Published 2014 by Association of Bay Area Governments, 24 pages.



Cascading Failures: Earthquake Threats to Transportation & Utilities

This report maps airports, passenger rail, roadways, fuel, electric, and water systems, and highlights their interaction with seismic hazards. Publicly available information was used to describe how each system operates, and the consequence of system damage. The key findings warrant a transparent public discussion of the reliability the region desires for its vital infrastructure systems.

Details: Published 2014 by Association of Bay Area Governments, 52 pages.

Appendix B – Water Supply Infographics

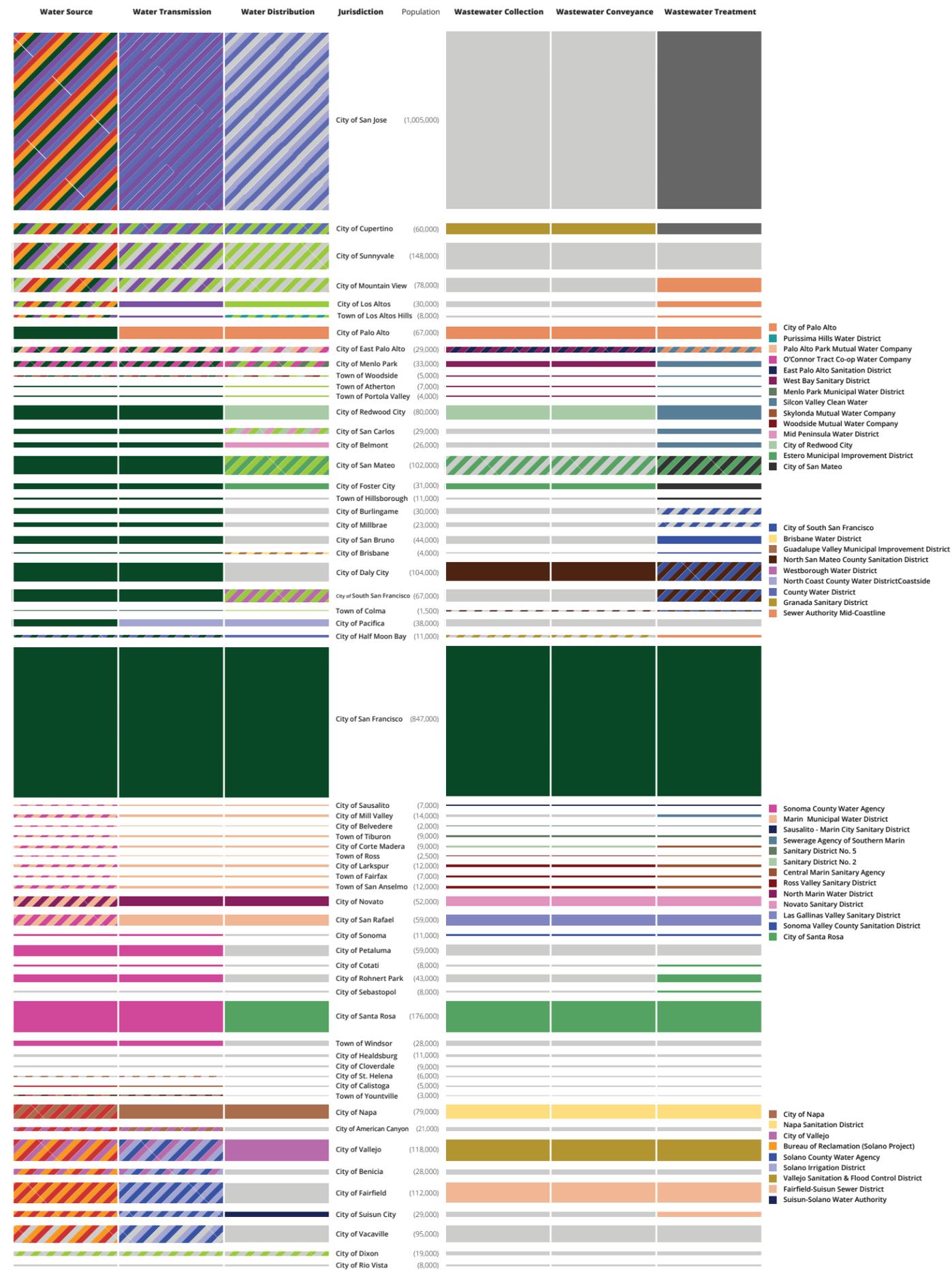
Resized graphics from July 27th Subcommittee Meeting posters. For full size (large file size graphics) please contact Michael Germeraad (ABAG) at michaelg@abag.ca.gov.

BAY AREA URBAN WATER SYSTEM BARCODE

CITIES AND THEIR WATER & WASTEWATER



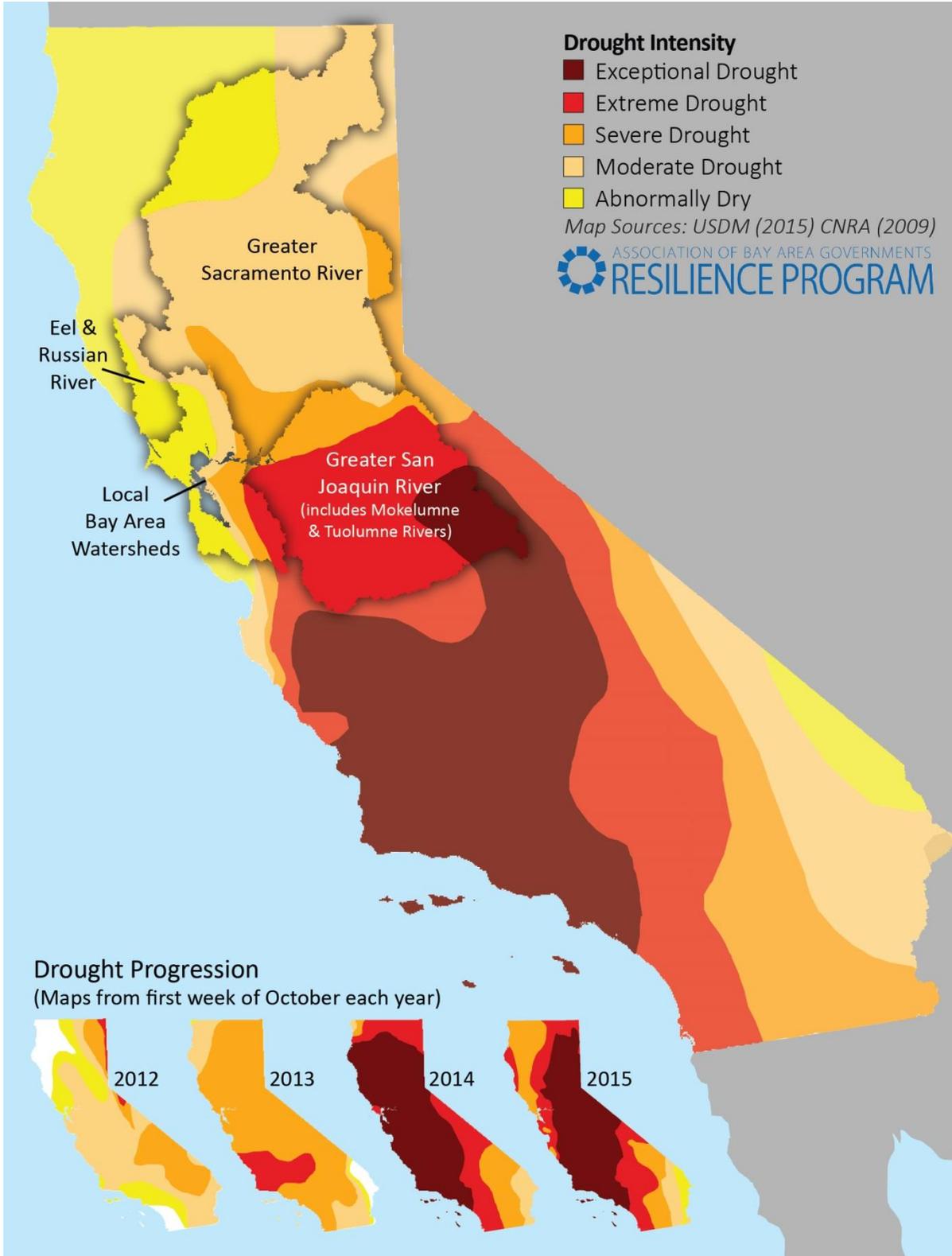
- Individual City Department
- Bureau of Reclamation (Central Valley Project)
- Contra Costa Water District
- Ironhouse Sanitary District
- Delta Diablo Sanitation District
- Mt. View Sanitary District
- Central Contra Costa Sanitary District
- East Bay Municipal District
- Hercules - Pinole JPA
- West County Wastewater District
- Stege Sanitary District
- CA Dept. of Water Resources (State Water Project)
- Zone 7 Water District
- Dublin San Ramon Services District
- San Francisco Public Utilities Commission
- Alameda County Water District
- Union Sanitary District
- Santa Clara Valley Water District
- San Jose - Santa Clara Regional Wastewater
- Great Oaks Water Company
- San Jose Water Company
- South County Regional Wastewater Authority
- West Valley Sanitation District
- California Water Service Company
- Cupertino Sanitation District



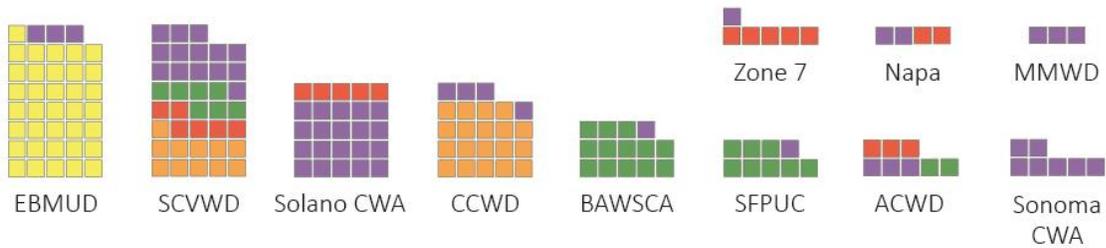
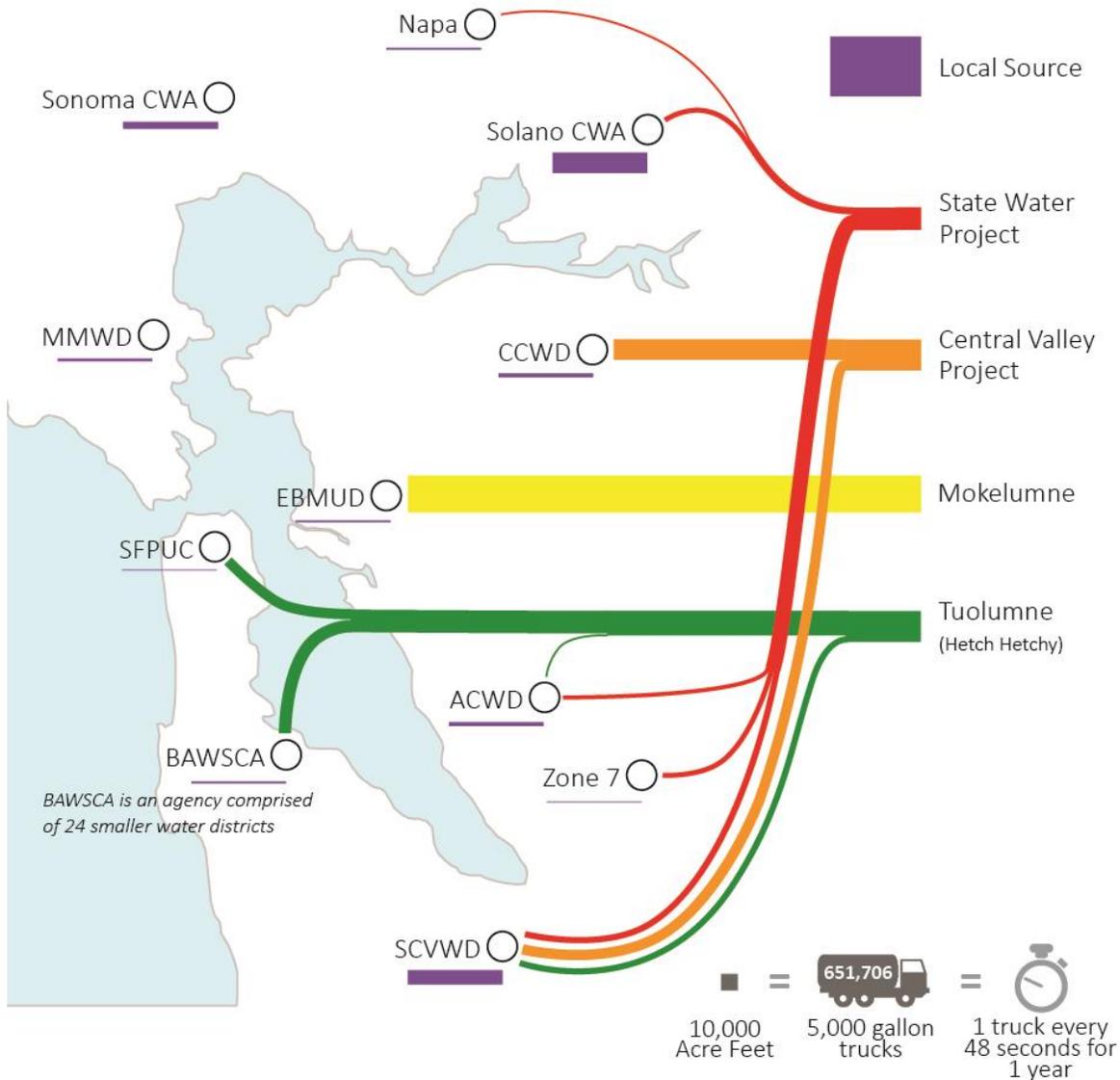
- City of Palo Alto
- Purissima Hills Water District
- Palo Alto Park Mutual Water Company
- O'Connor Tract Co-op Water Company
- East Palo Alto Sanitation District
- West Bay Sanitary District
- Menlo Park Municipal Water District
- Silicon Valley Clean Water
- Skylonia Mutual Water Company
- Woodside Mutual Water Company
- Mid Peninsula Water District
- City of Redwood City
- Estero Municipal Improvement District
- City of San Mateo
- City of South San Francisco
- Brisbane Water District
- Guadalupe Valley Municipal Improvement District
- North San Mateo County Sanitation District
- Westborough Water District
- North Coast County Water District/Coastside
- County Water District
- Granada Sanitary District
- Sewer Authority Mid-Coastline
- Sonoma County Water Agency
- Marin Municipal Water District
- Sausalito - Marin City Sanitary District
- Sewerage Agency of Southern Marin
- Sanitary District No. 5
- Sanitary District No. 2
- Central Marin Sanitary Agency
- Ross Valley Sanitary District
- North Marin Water District
- Novato Sanitary District
- Las Gallinas Valley Sanitary District
- Sonoma Valley County Sanitation District
- City of Santa Rosa
- City of Napa
- Napa Sanitation District
- City of Vallejo
- Bureau of Reclamation (Solano Project)
- Solano County Water Agency
- Solano Irrigation District
- Vallejo Sanitation & Flood Control District
- Fairfield-Suisun Sewer District
- Suisun-Solano Water Authority

Created by the Association of Bay Area Governments (2016).
The line thickness represents the population served. Population information is from ABAG (2015).
The water supply and wastewater system agency coverage was determined using Urban Water Management Plans, Sewer System Management Plans, and online district, agency, city, and county websites.

California Drought: Watersheds That Supply the Bay Area (July 2016)



Water System Source Portfolio (Eleven Bay Area Water Districts) & Annual Normal Supply



Data Source: 2010 Urban Water Management Plans