4th Annual Salt Lake Countywide

Watershed Symposium

August 4&5, 2010

Utah Cultural Celebration Center
West Valley City, Utah

SALT LAKE COUNTY

WATER QUALITY STEWARDSHIP PLAN

Watershed Planning & Restoration Program
Salt Lake County Government Center
2001 South State Street, Suite N3100, Salt Lake City UT 84190
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Welcome!

As the host of the 4th Annual Salt Lake Countywide Watershed Symposium, Salt Lake County welcomes its community of water stewards and environmental advocates. This free two-day event is made possible through collaboration with numerous individuals and agencies. In particular, we'd like to thank our presenters for their willingness to share their experience and expertise with us. Additionally, we'd like to thank Salt Lake County Mayor Peter Corroon and the Utah Division of Water Quality for their support in helping to make the Symposium a reality.

The goal of the Watershed Symposium is to foster a multi-faceted review of the current state of our watershed and facilitate discussions between the general public, environmental advocates, policy makers, teachers, students, water quality experts, and those working in related professions. Feature presentations, field trips and workshops—from general interest to technical—will explore a broad scope of watershed issues. The Symposium also serves as the annual meeting for the Jordan River Watershed Council.

In order to assist us in future efforts, we would very much appreciate feedback and suggestions. Please take a moment to fill out the Comment Card included in the check-in packet.

Thank you and enjoy the Symposium!

Salt Lake County Staff

SALT LAKE COUNTY

WATER QUALITY STEWARDSHIP PLAN

JORDAN RIVER WATERSHED COUNCIL

i love the jordan river
salt lake county watershed planning and restoration

We All Live Downstream
stormwatercoalition.org

2010 Salt Lake Countywide Watershed Symposium

Event Schedule

Utah Cultural Celebration Center, West Valley City UT

WEDNESDAY August 4, 2010				
Time	Activities			
8:30-9:30	**Check-in/Registration**			
9:30-10:00	**KEYNOTE—Collaborating to Protect Our Quality of Life** Mayor Peter Corroon, *Salt Lake County (Great Hall)*			
Room	Great Hall	Room 101/102	Room 104/105	
10:10-11:00	**Wasatch Canyons Tomorrow: Loving Our Canyons to Death?** Gabe Epperson, *Envision Utah*	***E.Coli* Monitoring: Building a Network to Assess Recreational Uses** Jim Harris, *Utah Division of Water Quality*	**Jordan River TMDL Study Update** Hilary Arens, *Utah Division of Water Quality*	
11:10-12:00	**What Can You Buy with $48 Million? A Look at the Salt Lake County Parks & Open Space Bond** Julie Peck-Dabling, *Salt Lake County Open Space*	**What's in Our Stormwater?** Steve Burgon, *Salt Lake County* Julie Howe, *Stantec Consulting*	**Supplemental Studies & Modeling in Support of the Jordan River TMDL Process** Theron Miller, *Jordan River/Farmington Bay Water Quality*	
12:00-1:10	**LUNCH**—*provided for registered participants*			
1:10-2:00	**Tools to Protect and Restore the Jordan River: A Clean Water Act Intro** Merritt Frey, *River Network*	**Phragmites Control and Containment Effort** Randy Berger, *Utah Division of Wildlife Resources*	**Tracking the Sources of Bacteria of Human Origin: Implications & Control Strategies** Ramesh Goel, *University of Utah*	FIELD TRIP **Kayak Tour of Jordan River Restoration** Adriaan Boogaard Bob Thompson *Salt Lake County* *(Limit 15, likely to go longer than 3pm)*
2:10-3:00	**When DWQ Does NOT Want You to Go Green!** Paul Krauth, *Utah Division of Water Quality*	**Tamarisk Impacts on Water Cycle, Before, During & After Defoliation by Saltcedar Leaf Beetle** Kevin Hultine, *University of Utah*	**Sediment Oxygen Demand, Re-aeration, and the Fate of Nutrients in the Jordan River: What We've Learned So Far** Ramesh Goel, *University of Utah*	

General Interest/Introductory to Intermediate Level
Technical/Intermediate to Advanced

THURSDAY August 5, 2010				
Time	Activities			
9:30-10:00	**Check-in/Registration**			
Room	Great Hall	Room 101/102	Room 104/105	
10:10-11:00	WORKSHOP **Stormwater Bioretention & Rainwater Harvesting: Fun for Engineers and the Whole Family!** Steven Burian Christine Pomeroy *University of Utah Urban Water Group*	**Utah's Proper Medication Disposal Program: Preventing Abuse, Poisonings, and Pollution** Leah Ann Lamb, *Utah Division of Water Quality*	**Stewardship Thinking in the Great Salt Lake Watershed** Lynn de Freitas, *FRIENDS of Great Salt Lake*	FIELD TRIP **Wetland Creation and Enhancement at the Redwood Nature Area** Mary DeLoretto, *Utah Transit Authority* Todd Sherman, *Wetland Resources* *(Limit 15)*
11:10-12:00		**Salt Lake County Watershed Water Quality Model** Nick von Stackelberg Bryan Close, *Stantec Consulting*	**Water Rights Sales & Transfers: What You Need to Know** Wendy Bowden Crowther, *Clyde Snow & Sessions*	
12:00-1:10	**LUNCH**—*provided for registered participants*			
1:10-2:00	**Water Supply Outlook** Brian McInerney, *National Weather Service*	**Reestablishing Natural Processes Through Watershed Restoration** Eric McCulley, *SWCA* Ben Bloodworth, *Utah Division of Forestry, Fire, and State Lands*	**Using Waterwise Landscape Principles to Address Increasing Water Demand** Courtney Brown, *Jordan Valley Water Conservancy District*	FIELD TRIP **Wastewater Treatment Facility Tour** Reed Fisher Tom Holstrom *Central Valley Water Reclamation Facility* *(Limit 15, must be 10 years or older)*
2:10-3:00	**Balancing Conservation & Development on the Jordan River** Emy Storheim, *Salt Lake City Open Space Lands*	**Onsite Wastewater System Challenges** Jeremy Roberts Ron Lund, *Salt Lake Valley Health Dept.*	**Land Management Practices at Kennecott** Ann Neville, *Kennecott Utah Copper*	

Keynote

Collaborating to Protect Our Quality of Life

Mayor Peter Corroon
Salt Lake County
2001 South State Street, Suite N2100, Salt Lake City UT 84190
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Session Abstracts (listed alphabetically by title)

Balancing Conservation & Development on the Jordan River

Emy Storheim, Open Space Land Program Manager
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This presentation will provide an overview of projects and efforts along the Jordan River in Salt Lake City including large-scale recreation projects to small-scale restoration sites. Salt Lake City is working to enhance the Jordan River Corridor for the benefit of the community while working to sustain the natural environment that provides ecosystem services.

E.Coli Monitoring: Building a Network to Assess Recreational Uses

Jim Harris, Section Manager
Utah Division of Water Quality
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This presentation will discuss the Utah Division of Water Quality's approach to assessing the state's waters for attainment of recreational uses and ongoing coordination efforts with citizen volunteers, state and local governments and federal partners. The recently implemented *E. coli* monitoring program presents a unique challenge in sampling methods, developing health advisories, and capacity building for increasing the scope of the monitoring program. The presentation will include case studies, recent data, an overview of the *E. coli* Workgroup activities, and future areas of focus.

Jordan River TMDL Study Update

Hilary N. Arens, Watershed Scientist, Jordan Basin Coordinator
Utah Division of Water Quality
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This presentation will provide an update on the current status of the Total Maximum Daily Load (TMDL) water quality study for the Jordan River. Topics to be covered include: updated current pollution source characterization, critical conditions, endpoints and permissible loads, total dissolved solids (TDS) and temperature impairments in the Jordan River, a proportional load allocation, and the upcoming least cost load allocation and practicable load allocation to address the dissolved oxygen (DO) impairment in the Jordan. The presentation will also detail next steps and the route to the completion of the TMDL.

Land Management Practices at Kennecott

Ann Neville, Senior Advisor Biological Resources
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Kennecott has developed a comprehensive land use management plan on our properties. A high-level goal of the plan is to optimize environmentally sustainable populations. To achieve this, a series of land management practices and projects have been implemented to improve our habitats and watersheds. Long standing practices have included: reclamation activities, ground water treatments, a deer and elk population control program; mountain lion research, and the Inland Sea Shorebird Reserve wetland mitigation site. More recent management activities include: a noxious weed reduction program in coordination with Salt Lake/Tooele County and the Bonneville Cooperative Weed Management Areas; a wild land fire prevention program working with Utah Division of Forestry, Fire and State Lands and the Bureau of Land Management; and partnerships with local universities, NGOs, and environmental regulatory agencies on a number of topics ranging from sagebrush community treatments for increases in biodiversity and responses to grazing, to wetland assessment methodology.

Onsite Wastewater System Challenges

Jeremy Roberts, Environmental Health Scientist
Salt Lake Valley Health Department
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In this presentation we will look at some of the major onsite wastewater system challenges that exist in Salt Lake County. In order to understand the challenges, we will go over the basics of how an onsite wastewater system works. With a basic understanding of onsite systems, the first major challenge that we will talk about is property site constraints. Next we will discuss the challenges of homeowner awareness and what they need to do to maintain their system. In finishing up, we will discuss aging wastewater systems and what to do as onsite wastewater systems begin to fail. Throughout the presentation we go through many real world challenges that the Salt Lake Valley Health Department Onsite Wastewater employees work through on a day to day basis. This makes the Onsite Wastewater Program a challenging and enjoyable program to work in.

Phragmites Control and Containment Effort

Randy Berger, Wetland Manager
Utah Division of Wildlife Resources
11210 North 3000 West, Deweyville UT 84309
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This presentation will cover the Division of Wildlife Resource's (UDWR) current plan for treating 10,000+ acres of invasive *Phragmites australis*, common reed, which has invaded and expanded in managed UDWR wetlands in Utah. This effort is primarily directed to the wetlands associated with the eastern portion of the Great Salt Lake shoreline and adjacent areas. There are an additional ten other invasive weeds that are a part of this treatment plan and they will be briefly mentioned. The presentation will cover the project's inception in 2006 and what has transpired since that time in the ongoing effort. Currently 5,400 acres are with some phase of the treatment plan. Treatment for this fall, 2010, will begin mid-August.

Reestablishing Natural Processes Through Watershed Restoration

Eric McCulley, Watershed Ecologist
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emcculley@swca.com | (801) 520-2505

Ben Bloodworth, GIS Lands Coordinator
Utah Division of Forestry, Fire & State Lands
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There has been a substantial investment in restoration and rehabilitation of wetlands and riparian habitats in the Great Salt Lake Watershed for the last few decades. The wide variety of project types and funding sources has led to a broad range of successes and failures of these projects. Significant issues related to these projects have included a lack of pre- and post-project monitoring, poor design of hydrology, invasion of sites with undesirable plant species, and improper or inadequate construction practices. In order to move forward and develop more successful restoration practices for these aquatic habitats, we need to develop a comprehensive plan for long-term management of these sites. We also need to determine what the most cost effective strategies are to help practitioners develop sustainable projects that will continue to benefit Utah wildlife and people for many years to come. There are typically three areas that restoration projects can fail: planning, implementation, and follow-up. Each of these steps in the process can lead to issues with long-term sustainability of projects. Working together with many groups in the watershed to share successes and failures is an essential key to improving conditions on a watershed scale.

Salt Lake County Watershed Water Quality Model

Nick von Stackelberg, Water Resources Engineer
Bryan Close, Water Resources EIT

Stantec Consulting
3995 South 700 East, Ste. 300, Salt Lake City, UT 84107
www.stantec.com | (801) 261-0090

The Salt Lake County Engineering and Flood Control Division is developing a countywide watershed water quality model. The objective of the watershed model is to be an ongoing stormwater, flood control and water quality planning and management tool. The model uses the Hydrologic Simulation Program FORTRAN (HSPF) to simulate hydrologic and water quality processes on a watershed scale. HSPF simulates the complex interaction between snowmelt, nonpoint and point pollution sources, flow diversions and irrigation return flow within Salt Lake County. The model simulates the loading of sediment and nutrients from the watershed, as well as fate and transport in the stream network. The presentation will summarize the model build using GIS data and tools, the model calibration to observed stream flow and water quality data, and the future application of the model for watershed management and planning purposes.

Sediment Oxygen Demand, Re-aeration, and the Fate of Nutrients in the Jordan River: What We've Learned So Far

Ramesh Goel
University of Utah, Environmental Engineering
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rgoel@civil.utah.edu

Sediment oxygen demand and internal recycling of nutrients are two major components of the QUAL2K water quality model. These parameters are often estimated based on modeling simulation rather than in-situ experiments. We estimated these two parameters including re-aeration coefficient at several locations along Jordan River. This presentation will talk about the results obtained so far, how these were used by the Utah Division of Water Quality to update the model, and what more is needed to adequately address the nutrient issues in Jordan River.

Stewardship Thinking in the Great Salt Lake Watershed

Lynn de Freitas, Executive Director
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The Great Salt Lake is located next to a growing metropolitan area with a population predicted to surpass 5 million people by 2050. It supports a rich and dynamic biological system of regional, national and global importance to millions of migratory birds, 250 avian species and more than 4 million waterfowl from the Pacific and Central flyways that use the lake for resting, nesting and staging. Great Salt Lake has been designated a Western Hemispheric Shorebird Reserve Site because of the extraordinary bird use. It is a destination place for national and international tourists. At the same time, the lake generates billions of economic dollars for the state through resource development of minerals, oil and gas development, and brine shrimp. Past and current management practices have resulted in a radically altered natural lake system, and a trend toward industrialization of the lake without a clear understanding about cumulative impacts and what constitutes ecological health of the system. As a public trust resource, we share a responsibility for the future of the Great Salt Lake. Let's have a conversation about how we can do this. Since 1994, FRIENDS of Great Salt Lake, a nonprofit organization has advocated for the preservation and protection of the Great Salt Lake Ecosystem through education, research, and advocacy.

Stormwater Bioretention and Rainwater Harvesting: Fun for Engineers and the Whole Family!!

Dr. Steven Burian
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Dr. Christine Pomeroy
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Urban Water Engineering & Sustainability Group
University of Utah, Civil and Environmental Engineering
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Urban water management is a critical issue at the forefront of sustainability. Municipalities and engineers are seeking solutions to improve the performance and sustainability of existing urban water infrastructure systems, plan and design sustainable water infrastructure solutions for newly urbanizing areas, and increase the overall efficiency of urban water systems. Part of the solution is to engage residents in programs to reduce water consumption, control stormwater on-site, and increase water reuse. Two practices that are being implemented across the country in the form of municipal programs are stormwater bioretention and rainwater harvesting. The emergence of these practices is causing a rapid evolution in policy, planning, engineering design, and more. This workshop will describe the basics of bioretention and rainwater harvesting systems and provide additional details of recent advances in design techniques and new information related to expected costs and benefits. The workshop will predominantly focus on issues and information specific to Utah applications, but also provide national and international perspectives. The last part of the workshop will describe the "fun for the whole family"—ways homeowners and business owners can plan and install simple, yet effective, bioretention and rainwater harvesting systems in Utah.

Supplemental Studies & Modeling in Support of the Jordan River TMDL Process

Theron Miller, Research Scientist
Jordan River/Farmington Bay Water Quality Council
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The Jordan River Total Maximum Daily Load (TMDL) is by far the most complicated TMDL in the State of Utah. Important issues include the influence of Utah Lake; massive (93%) diversion in the narrows; groundwater and irrigation return flows, including Utah Lake water; urbanization, which has included

channel straightening, containment by levees, stream bank and tributary bank erosion; and considerable contributions of nonpoint sources of sediment, organic debris and nutrients, and the nutrient contribution of three POTW plants. Studies are continuing in 2010 that include additional sediment oxygen demand measurements, periphyton growth measurements, and light and dark chamber measurements to measure primary production and respiration rates that may correlate to zones that experience the low dissolved oxygen concentrations. These studies, and results from the 2009 studies, are being used to populate the QUAL2K water quality model in order to improve accuracy and identify the causes and potential remediation efforts for the Jordan River. Preliminary data and model results will be presented and discussed.

Tamarisk (*Tamarix ssp.*) Impacts on the Water Cycle

Kevin Hultine
University of Utah, Biology
257 South 1400 East, Room 201, Salt Lake City UT 84112
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Protecting water resources for expanding human enterprise while conserving valued natural habitat is among the greatest challenges of the 21st century. Global change processes such as climate change and intensive land use pose significant threats to water resources, particularly in arid regions where potential evapotranspiration far exceeds annual rainfall. Potentially compounding these shortages is the progressive expansion of introduced plant species in riparian areas along streams, canals and rivers in geographically arid regions. The question of whether these invasions have had or will have impacts on watershed, basin, or regional scale water resources is currently under intense debate. This talk sets out to identify when and where introduced riparian plant species are likely to have the highest potential impact on hydrologic fluxes of arid and semi-arid river systems. My focus will be on on three introduced plant systems as model species that currently dominate southwestern U.S. riparian forests. These include tamarisk (and tamarisk/saltcedar leaf beetle interactions), Russian olive, and Russian knapweed. I will develop a framework that focuses on two main criteria: 1) examination of the ecophysiological traits that promote introduced species establishment across environmental gradients, and 2) assessment of how and to what extent hydrologic fluxes are altered by the establishment of introduced species at varying scales from individual plants, to small river reaches, to entire river basins. The development of a comprehensive framework that describes introduced species impacts on the water cycle will assist land managers and policy makers with future restoration and conservation priorities to preserve water resources and valued riparian habitat given limited economic resources.

Tools to Protect and Restore the Jordan River: A Clean Water Act Intro

Merritt Frey, Habitat Program Director
River Network
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This beginner to intermediate session will introduce participants to Clean Water Act tools used to protect and restore the Jordan River. The Clean Water Act's objective is to protect and maintain the chemical, physical and biological integrity of the nation's rivers, lakes and wetlands. Although the Act is a federal law, implementation of the Act's programs is largely coordinated by the states and on-the-ground efforts require local action. Participants will learn about several core Clean Water Act programs and how they apply to our vision of a clean, healthy Jordan River. What might seem like abstract legal ideas will be illustrated through application to the Jordan, and the focus will be on turning Clean Water Act programs into useable tools for citizens, elected officials, and others. Participants will leave understanding the basics of how water quality goals are assigned to the Jordan (water quality standards), how pollution discharges to the Jordan are regulated (UPDES permits) and how plans for restoration are developed and implemented (Total Maximum Daily Loads).

Tracking the Sources of Bacteria of Human Origin: Implications and Control Strategies

Ramesh Goel
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Bacterial contamination from human sources is more dangerous and pathogenic than from other sources. Hence, in a watershed, it is very important to know what is the source of bacterial contamination in a water body. This presentation will talk about microbial source tracking, issues related to it and ongoing projects.

Using Waterwise Landscape Principles to Address Increasing Water Demand

Courtney Brown, Conservation Programs Manager
Jordan Valley Water Conservancy District
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Faced with periodic droughts and ever increasing population growth in the Salt Lake Valley, Jordan Valley Water Conservancy District is looking to educate water users on the wise use of water, especially in the landscape where an estimated 60-65% of all treated water is applied. The Conservation Garden Park and future WaterSmart Education Center are resources in this education process, where the public can see firsthand the principles of waterwise landscaping, which are: planning and design, soil analysis, practical turf areas, appropriate plant selection, efficient irrigation, use of mulches, and proper maintenance.

Utah's Proper Medication Disposal Program: Preventing Abuse, Poisonings and Pollution

Leah Ann Lamb, Assistant Director
Utah Division of Water Quality
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The Utah Department of Environmental Quality developed a statewide "Proper Medication Disposal Grant Program" to provide an alternative to flushing medications after being approached by Florence Reynolds, Water Quality Administrator for Salt Lake City, to assist with funding medication disposal bins at both of the city's police stations. What started as a pollution prevention initiative soon morphed into an extensive collaborative effort with many other stakeholders to address issues of abuse, diversion, and poisonings in households. This presentation will give an overview of the program and the complex legal, social and environmental issues involved. In national forums this presentation is titled: "Death, Diversion, Detection and Disposal" and issues relative to each will be discussed.

Wasatch Canyons Tomorrow: Loving Our Canyons to Death?

Gabe Epperson, Planning Director
Envision Utah
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Wasatch Canyons Tomorrow is an update to Salt Lake County's 1989 Wasatch Canyons Master Plan for City Creek, Red Butte, Emigration, Parley's, Millcreek, Big & Little Cottonwood Canyons. This project is a partnership between Salt Lake City, Salt Lake County, the State of Utah and the U.S. Forest Service, with Envision Utah as the facilitators. Wasatch Canyons Tomorrow employs public process to identify contemporary concerns and educate the public on canyon issues. By some credible estimates, there will be 3 million people in the Salt Lake Valley by the turn of the next century. Inevitably, this growth will

further stress mountain resources. Each canyon in the study area is environmentally sensitive and limited in its ability to sustain use impacts. To water providers, the canyons house the water source that provides the drinking water to a thirsty population. Threats to the quantity and quality of that water abound. Some private landowners have dreams of developing their land and feel that their property rights are overly constrained. Many people enjoy escaping the valley, but find cherished solitude ever more elusive. Most are concerned with increasingly congested mountain roads, but differ over the appropriate solution. Despite differing perspectives, three things are clear. First, there is broad consensus that our mountain canyons are a highly valued resource worthy of our care and attention. Second, defining strategies to solve canyon challenges will be found through continuing open communication, respect and civility, sound research, and simple hard work. And third, because of continuing population growth, we simply cannot maintain current conditions by pursuing today's strategies.

Water Rights Sales and Transfers: What You Need to Know

Wendy Bowden Crowther
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This session will focus on the process of purchasing water rights, updating the title to water rights and transferring water rights for your intended use. The presentation will start with a simple overview of how water rights may be bought and sold and the process for updating title with the Utah State Engineer. I will focus on the potential errors that can be made in transferring land and water right title. Next the session will focus on the change application process. I will provide an overview of the administrative process and again address the potential pitfalls that may limit your ability to change the use of your water right.

Water Supply Outlook

Brian McInerney, Hydrologist
National Weather Service
brian.mcinerney@noaa.gov | (801) 971-2033

The 2010 water year will go down as a very strange time. Below average snowpacks produced flooding and over 5 million dollars in damage in multiple locations in Utah and Wyoming. This session will explain the weather and hydrological conditions that created this scenario. Additionally, the current water supply conditions, temperature, and precipitation levels will be reviewed for the summer months.

What Can You Buy with $48 Million? A Look at the Salt Lake County Parks & Open Space Bond

Julie Peck-Dabling, Open Space & Urban Farming Program Manager
Salt Lake County
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In 2006 Salt Lake County voters approved a $48 million dollar bond to purchase land for future Parks and Open Space. Since that time the County created an Open Space Acquisition Plan and application process, and then began acquiring property. During this session we'll take a look at the broad variety of parcels acquired to date, their conservation and watershed values, and hear about the Open Space Program's transition into the Stewardship Phase of these valuable public assets.

What's in Our Stormwater?

Steve Burgon, Stormwater Program Supervisor
Salt Lake County
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Julie Howe, Environmental Scientist
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www.stantec.com

Salt Lake County has been conducting stormwater sampling since 1992 in accordance with their State of Utah, UPDES permit. This sampling is conducted with the intent to evaluate stormwater quality in order to minimize impacts caused by these discharges. Stormwater runoff in urban areas is known to contain pollutants such as sediment, nutrients, oil and grease, as well as bacteria. These pollutants can cause impacts to receiving waters due to reduced oxygen levels, decreased spawning areas and alteration of species distribution. Stormwater sampling serves to measure the amount of pollutants being discharged to our surface waterbodies, which will lead to the implementation of measures to reduce the discharge of pollutants, as appropriate. Salt Lake County presents a unique challenge for stormwater sampling due to our dry climate. Specific storm criteria must be met prior to initiating sampling; the storm must result in runoff before it can be sampled. Historical storms were evaluated to determine what constituted a "representative storm" for the County; storms with more than 0.2 inches of rain are sampled. Sample teams are mobilized when weather forecasts predict a frontal storm of sufficient size. Teams are sent to six sample stations to collect three types of samples including: base samples prior to the storm, rise samples when the storm runoff begins, and flow-weighted composites taken throughout the storm. These samples are analyzed for numerous constituents; the results of which are analyzed in order to identify trends in stormwater quality. Salt Lake County submits a Technical Report on Stormwater Quality to the Division of Water Quality approximately every five years. This presentation provides a summary of the 2008 Technical Report, and includes analysis of the impact of landuse and population on stormwater quality, as well as overall trends in stormwater quality.

When DWQ Does NOT Want You to Go Green!

Paul Krauth, Outreach Coordinator
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The Utah Division of Water Quality (DWQ) recently completed a cost study on what it would take to meet differing nitrogen and phosphorus requirement for Utah wastewater treatment plants. The study looked at the current treatment processes at 30 mechanical treatment plants. Current facility performance was modeled to calibrate and establish performance baselines. Alternatives were assessed with facility managers to establish basic upgrade requirements for four different nutrient removal levels. This presentation presents the range of upgrade costs and impacts on monthly bills. Costs for upgrading these facility types are compared based on life cycle costs, flow/nutrient load normalized costs and impacts to used charges.

Field Trips

Kayak Tour of Jordan River Restoration

Bob Thompson, Water Resources Specialist
Salt Lake County
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Adriaan Boogard, Jordan River Advocate
(801) 243-2647

Float the Jordan River to observe past, present, and potential restoration efforts, as well as to evaluate the current status of the river's ecosystems. Weather and time permitting, the trip will also include a walking tour of open space properties along the river. Be sure to bring sun protection, plenty of drinking water, and walking shoes!

Wetland Creation and Enhancement at Redwood Nature Area

Mary DeLoretto, Environmental Studies Manager
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Todd Sherman, Wetland Scientist
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The Redwood Wetland Mitigation Site is located along the Jordan River within the Redwood Nature Area, which is managed by Salt Lake County Parks and Recreation. The 35-acre wetland mitigation site was created by the Utah Transit Authority to offset a portion of the wetland impacts associated with the Frontrunner South commuter rail project, which will run from Salt Lake City to Provo when completed. The mitigation site includes approximately 14 acres of created wetland, and 7 acres of enhanced wetland. The wetlands were created by utilizing the County's water shares in an adjacent irrigation canal to provide hydrology for several excavated wetland habitats. Wetland plant communities at the mitigation site include wet meadow, marsh, shrub, and forested habitats. The mitigation site was constructed in 2009 and is still a work in progress. Current maintenance and management issues include weed control and establishment of desirable native vegetation. The site was used extensively this spring by numerous species of waterfowl and shorebirds. Come and visit this great project along the Jordan River and learn about the planning and construction of a large-scale wetland creation project.

Wastewater Treatment Facility Tour

Reed Fisher, General Manager
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Tom Holstrom, Assistant Manager
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Central Valley Water Reclamation Facility
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The Central Valley Water Reclamation Facility is one of four regional facilities to serve Salt Lake County as a result of the Salt Lake County 208 Planning effort in the mid-1970's. Five Special Districts and two municipalities signed the Central Valley Water Reclamation Facility Interlocal Agreement in 1978. The five Special Districts are Granger-Hunter Improvement District, Taylorsville-Bennion Improvement District, Kearns Improvement District, SLC Suburban Sanitary District No. 1, and Cottonwood Improvement District. The two municipalities are South Salt Lake City and Murray City.

The treatment facility was constructed on the site of the old 16 million gallons daily (mgd) SLC Suburban Sanitary District No. 1 trickling filter plant. The protracted availability of EPA construction grant monies dictated that over 40 separate construction and procurement contracts be issued between 1982 and 1988.

The completed facility had an initial capacity of 50 mgd and employed the trickling filter/solids contact process, with anaerobic digestion of primary and waste secondary solids, and cogeneration of electricity and heat. The facility also included a complete laboratory/pretreatment complex and maintenance shop.

Today, Central Valley has a rated capacity of 75 mgd and serves over 500,000 people. The plant meets 50% of its electrical and heat energy needs through its cogeneration system, which includes five lean-burn turbocharged engine driven generators (1200kw each). The plant composts nearly 12,000 wet tons of belt-pressed solids annually and delivers another 20,000 wet tons to an agricultural land-application site. Central Valley also maintains a 1.5 mgd water recycling system and irrigates an 80-acre golf course which is located on plant properties earmarked for future plant expansion. Central Valley employs 80 people to maintain the interceptors, plant, laboratory and pretreatment systems.

Bios

Hilary Arens works in the Watershed Protection Section for the Utah Division of Water Quality, with a focus on the Jordan Basin TMDL. The Jordan River TMDL is a complex process and she believes that by working closely with the Technical Advisory Committee and the Scientific Review Committee formed in the fall of 2009, the TMDL will be comprehensive and on track for submission to EPA by the spring of 2011. Hilary has a Masters in Watershed Science from Colorado State University where she conducted her research on the planning qualities that has led to the successful implementation of watershed plans and projects.

Randy Berger is a Wildlife Wetland Biologist for the Utah Division of Wildlife Resources (DWR) and has been working in wetlands for the Division for 25 years. Current assignments include: Assistant Wildlife Manager for the Northern Region; Wetland Manager for Salt Creek Waterfowl Management Area, Locomotive Springs Waterfowl Management Area, Public Shooting Grounds Waterfowl Management Area and West Bear River Bay Access Area; and Project Leader for the Invasive and Noxious weed Project for the DWR for managed waterfowl management areas in the state.

Ben Bloodworth obtained a Bachelor's of Science in Biology from Furman University in Greenville, SC, and a Master's of Science in Environmental Science from Alaska Pacific University in Anchorage, AK. He has worked for the States of Alaska, Mississippi, and Utah. In Mississippi Mr. Bloodworth worked for two years in wetland mitigation and restoration, aiding in the development of functional assessment models for wetlands and assisting in the preparation of wetland restoration plans and the establishment of mitigation banks. He currently works for the Division of Forestry, Fire, & State Lands, where he has spent five years as a wetland ecologist and in community wildfire protection planning and fuels reduction. Mr. Bloodworth has also developed a land management document for a 250-acre parcel of state owned land on the Jordan River where he is using various techniques, including mechanical methods, biocontrol, herbicide, and goats, to eradicate invasive species and restore the land to a more naturally functioning vegetative cover.

Adriaan Boogaard is a lifetime Jordan River enthusiast and advocate, and member of the Salt Lake County Open Space Conservation Board. His knowledge about the river and its ecosystem has been greatly appreciated at the Salt Lake Countywide Watershed Symposium; this will be his third year guiding the Symposium kayak trip.

Courtney Brown is the Conservation Programs Manager with Jordan Valley Water Conservancy District. He is a member of the American Water Works Association, the Utah Nursery and Landscape Association, and the Irrigation Association. He is also a board member of the Utah Water Conservation Forum and currently serves as Chair of the Water Policy Committee for the City of West Jordan.

Steve Burgon earned a Bachelor's of Science in Geology from the University of Utah and has completed nearly 18 years of hydrology and water quality work for Salt Lake County. Steve maintains the UPDES Stormwater Management plan and all BMP's, and sampling required to assess progress in pollution prevention. He worked for the Forest Service, Engineering, Geophysics and Mining companies prior to Salt Lake County. Steve is a Registered Stormwater Inspector (RSI), a member of The Association of Environmental and Engineering Geologists (AEG) and the American Public Works Association (APWA), and All Around Good Guy (AAGG). He has two sons in college and is continuously working on his golf game and fishing, and enjoying it.

Steven J. Burian is an Associate Professor in the Urban Water Group in the Civil and Environmental Engineering Department at the University of Utah. Dr. Burian has taught courses in sustainable urban water engineering, stormwater management and design, water management, hydrology, hydraulics, sustainable design, flood modeling, and hydrologic field measurements for more than a decade. He earned a B.S. in Civil Engineering from the University of Notre Dame and a M.S.E. in Environmental Engineering and a Ph.D. in Civil Engineering from The University of Alabama. Dr. Burian's research team contributes to the engineering of sustainable and secure urban systems. Focus research areas include sustainable development and urban water infrastructure design, integrated urban water management, modeling and simulation of urban water systems and extreme floods, and the water energy-nexus. Reporting on these topics, Dr. Burian has authored or co-authored more than 35 peer-reviewed journal articles and book chapters, more than 60 conference papers and project reports, and delivered several software packages and databases. He is active in numerous professional societies including the American Society of Civil Engineers (ASCE),

American Water Resources Association (AWRA), Water Environment Federation (WEF), American Geophysical Union (AGU), and American Society of Engineering Educators (ASEE). He is currently serving as the national chair of the ASCE Rainwater Harvesting technical committee. He is a registered professional engineer in Utah.

Bryan Close has three years experience as a water resources engineer. He received a Bachelor of Science in Civil Engineering from Montana State University in 2007. He grew up in Salt Lake City and has worked for Stantec Consulting in Salt Lake City since he graduated in 2007. Brian has experience in hydrologic modeling, hydraulic modeling, water quality modeling as well as GIS analysis. He has worked with Salt Lake County on several projects including the countywide watershed model and stormwater representative sampling.

Peter Corroon was elected in November 2004 as Mayor of Salt Lake County, Utah's second largest government. He was re-elected in 2008, with 66 percent of the vote. Throughout his tenure, Mayor Corroon has consistently prioritized quality government through fiscally responsible policies that reflect his goal of an open, honest, and ethical government, and economic development policies to create better, higher paying jobs. Mayor Corroon has proven to be fiscally conservative. In 2009, He bucked his own party and vetoed a tax-increase and shaved over $140 million from the net County budget and reduced its workforce by 300 employees. Economic development, particularly building opportunities for small and medium sized Utah businesses has been a priority for Mayor Corroon. Mayor Corroon also recognizes that one of Utah's greatest assets is our natural environment, and believes that being a good steward of our air and water quality is critical for Utah's long-term success. In addition to being mayor of Salt Lake County, Mayor Corroon also serves as a board member for the National Association of Counties, the United Way, the Economic Development Corporation of Utah, the Utah Technology Council and the Utah State Board of Tourism. Peter has a bachelor's of science degree in Civil Engineering, a master's degree in Real Estate Development and Finance and a Law degree. He lives in Salt Lake City with his wife, Amy, and their three children. They all enjoy recreation, church and school activities together.

Wendy Bowden Crowther is a shareholder at the firm of Clyde Snow & Sessions, P.C. Her practice is focused on Water Law but she also works extensively in the areas of Natural Resources Law, Environmental Law, and Eminent Domain (Condemnation). Ms. Crowther represents municipalities, water districts, irrigation companies, and individual water right holders. Ms. Crowther regularly appears before the Division of Water Rights (Utah State Engineer) as well as the state and federal courts. She has experience representing clients in matters dealing with Reclamation Law, the Clean Water Act, and the Clean Air Act. Ms. Crowther is Vice-Chair of the Utah State Bar Energy, Natural Resources & Environmental Law Section. She currently serves as the Section Treasurer. Prior to becoming Section Treasure, Ms. Crowther served as Chair of the Water Law Committee. Ms. Crowther is the Chair of the American Bar Association Section of Environmental, Energy and Resources' Water Law Committee and she was Co-Chair of the 2008 ABA Water Law Conference.

Lynn de Freitas is the Executive Director of FRIENDS of Great Salt Lake, a nonprofit organization whose mission is to preserve and protect the Great Salt Lake Ecosystem through education, research, and advocacy. She began her involvement with FRIENDS shortly after its founding in 1994. She became President in 1996 until becoming Executive Director in 2002. In those leadership positions she is part educator, part citizen advocate, part convener of disparate parties, part nonprofit organization leader and part conservation activist. She has worked in this capacity as a full time volunteer. She especially enjoys working on developing policies that address the unique role and characteristics of the Great Salt Lake to ensure its long term sustainability. Prior to her affiliation with FRIENDS, she was a library media coordinator for 18 years in both public and private schools in the Salt Lake area. She holds a B.S. in Biology from Montclair State College and an M. Ed in Educational Systems and Learning Resources from the University of Utah. In 2007, she received the Girl Scouts of Utah Award for Courage, Confidence and Character. In 2006, she was awarded the Calvin K. Sudweeks Award for outstanding contributions in the water quality field in the State of Utah by the Utah Water Quality Board. In 2002, she received the Utah Environmental Educator Volunteer of the Year Award from the Utah Society for Environmental Education. In her free time, she is an avid birder, enjoys travel and is learning dressage.

Mary DeLoretto is the Environmental Studies Manager for Utah Transit Authority. Her environmental team provides support for UTA's Capital Development Program projects from the start of environmental analysis through completion of project construction. Mary is also responsible for identifying and overseeing the implementation of

mitigation commitments for environmental impacts from UTA's construction projects, including their commuter rail, light rail, and bus rapid transit projects. Mary has a B.S. and M.S. degree in Chemical Engineering from Rutgers University. Prior to working for UTA, she worked for seven years at the Utah Department of Environmental Quality in both their Water Quality and Air Quality Divisions and worked as a project manager for 12 years at an environmental consulting firm in Salt Lake.

Gabe Epperson began working for Envision Utah in 2003, starting as an Assistant Planner working on efforts in Salt Lake County (Sandy City 9400 South TRAX Site Plan) and Box Elder County (Brigham City and Perry City General Plans). In 2004, he began the development of the Envision Utah Economic Development Toolbox, which was completed in 2005. The Economic Development Toolbox is a 150+ page document with straightforward guidelines for local governments to prepare for economic growth, attracting higher-paying businesses and high-skilled workers. Beginning in 2005, Mr. Epperson, began serving as the Project Lead for the Wasatch Choices 2040 project: a 4- County land use and transportation visioning process that was used by two Metropolitan Planning Organizations (Wasatch Front Regional Council and Mountainland Association of Governments) as the official land use scenario for their Long Range Transportation Plans. Through the Wasatch Choices process, he served as the lead GIS specialist in mapping the public input and creating the Vision map. He also co-authored the Wasatch Choices 2040 Final Report. In 2006, Gabe worked on the Downtown Rising joint visioning effort undertaken by the Salt Lake Chamber of Commerce and Salt Lake City. Through Downtown Rising, he facilitated several technical teams that developed transportation and economic development strategies for Downtown Salt Lake City. In the last two years, Gabe has been the Project Manager for two major regional planning efforts along the Wasatch Front relating to watershed management and planning, including the Blueprint Jordan River, and the Wasatch Canyons Tomorrow projects. He was promoted to Planning Director in July 2008. In 2003, Gabe completed his B.A. in Environmental Studies/Human Ecology from Middlebury College, VT. In 2007, he finished his Thesis on "Measuring the Land Use Impacts on Regional Transportation along the Wasatch Front," and received a Master's Degree in Public Administration from the University of Utah.

Reed Fisher has been General Manager of the Central Valley Water Reclamation Facility for 20 years. He was Division Manager for the Consulting Engineering Firm of DMJM for 20 years, involved with the design and construction of many water and waste water facilities in the U.S. He was Principal-in-Charge and financial manager for the $130,000,000 Central Valley Waste Water facility. Mr. Fisher is Professional Engineer in the State of Utah and has a B.S. degree from the University of Utah. He served as president of the Water Environment Association of Utah. He served on the State of Utah Operator Certification Council for 11 years.

Merritt Frey is River Network's Habitat Program Director, and is based in Salt Lake City, Utah. Merritt brings thirteen years of Clean Water Act experience on the federal and state levels to her position, with a focus on water quality standards, pollution control permits and Total Maximum Daily Loads (TMDLs). Before joining River Network's staff in 2008, Merritt spent nearly 5 years as the Executive Director of the Utah Rivers Council, where in addition to serving as the lead fundraiser and manager, she led the organization's successful water quality project. Previously, Merritt worked on Clean Water Act policy for both the Clean Water Network and the Natural Resources Defense Council in Washington DC. She also spent time working for West Virginia Rivers Coalition, Union of Concerned Scientists, and National Tree Trust. Merritt has authored publications such as The Ripple Effect: A Guide to Making Waves in the Turbulent World of TMDLs and Source Water Stewardship, and co-authored Permitting an End to Pollution. In 2005, Merritt was one of ten western watershed leaders to receive a 3-year W.C. Kenney Foundation Leadership Grant to support outstanding work in the water community. In 2007, Merritt was appointed by Utah's Governor to the Utah Water Quality Board.

Ramesh Goel holds a Bachelors in Civil (1994) and Masters (1996) in Environmental Engineering from India and a PhD (2003) in Environmental Engineering from the University of South Carolina. He is most passionate about water quality related research including nutrients, microbial pollution and internal recycling of various contaminants in surface water bodies. Currently, Mr. Goel is working with Utah DEQ for the Jordan River, Utah Lake and Great Salt Lake.

Jim Harris earned a B.A. in English from the University of Illinois at Chicago, and a M.S. in Environmental Studies from the University of Montana where he focused on monitoring and assessment of nonpoint source pollution. For the past 10 years, he has worked for the Division of Water Quality primarily in the Total Maximum Daily Load Program, developing water quality management plans for the Sevier, Cedar/Beaver, and Jordan River watersheds. He has

managed the Monitoring Section for the past 2 years where he has concentrated on revising the Division's strategy for monitoring the states waters to provide better information and supporting data for water quality assessment, reporting, watershed management and compliance.

Thomas Holstrom is Assistant General Manager and Process Engineer for Central Valley Water Reclamation Facility. He holds a M.S. Degree in Civil and Environmental Engineering from Utah State University (1979). Mr. Holstrom has been a Registered Professional Engineer in Utah since 1982, formerly registered in California, Nevada, and Colorado. He has 27 years experience as a Civil Engineering Consultant in charge of the design of water, wastewater, and stormwater pumping, conveyance, and treatment works. He served as Project Engineer, Project Manager, and Resident Engineer during design and construction of the Central Valley Water Reclamation Facility from 1982-1994. Mr. Holstrom was awarded the "Contributor to the State of Excellence" award from the Office of the Governor, State of Oklahoma in 1987. He served as President of the Water Environment Association of Utah (WEAU) in 1997 and was awarded the Arthur Sidney Bedell Award from the Water Environment Federation in 1997.

Julie Howe, Environmental Scientist, graduated with a B.A. in Environmental Biology from the University of Colorado in Boulder, CO, and a M.S. in Environmental Engineering from the University of Washington in Seattle, WA. Ms. Howe has more than 20 years of experience in environmental planning and compliance. Ms. Howe's experience includes an emphasis on water resources, water quality and environmental management. Ms. Howe has worked with state and local agencies to prepare and assist in implementation of Stormwater Management Plans to support Phase 1and 2 Municipal Stormwater Discharge Permits. She has worked with municipal and industrial clients to prepare Stormwater Pollution Prevention Plans, to support the Multi-sector General Permits for stormwater discharges associated with industrial activities, including construction activities. In addition, Ms. Howe has worked with several federal, state and local agencies in the development of NEPA documents in accordance with federal law and local regulations. Ms. Howe has also worked with non-point source, stormwater and surface-water improvement studies and projects inspired by TMDL implementation efforts and analysis. She was also part of the team that developed the Salt Lake Countwide Water Quality Stewardship Plan for Salt Lake County. Member – Rocky Mountain Association of Environmental Professionals

Kevin Hultine is currently an Assistant Research Professor in the Department of Biology at the University of Utah. His current research focuses on plant ecophysiology, plant water relations, and ecohydrology with a major emphasis on riparian systems of the southwestern United States. Specifically, he has been studying tamarisk/saltcedar leaf beetle interactions and their impacts on riparian ecosystem processes and ecohydrology since 2006, with the Colorado River Basin being the major focus location. Major themes of Kevin's current research include: 1) Does herbivory by the saltcedar leaf beetle reduce tamarisk water use over large areas, and if so, does herbivory impact stream and river hydrology? 2) To what extent will herbivory alter plant community structure along river reaches of the southwestern U.S., and 3) Can we predict impacts of the saltcedar leaf beetle on tamarisk growth and mortality? His education history includes a B.S. in the Department of Forest Resources at the University of Idaho, a M.S. in the Department of Renewable Natural Resources at the University of Arizona, and a Ph.D. in the Department of Renewable Natural Resources, at the university of Arizona.

Paul Krauth is a native Utahan, born and raised in Salt Lake City. After a long and undistinguished career as a professional student earning three engineering degrees (a geek cubed), he went to work for the Utah Division of Water Quality in 1989. He worked for two and a half years in the UPDES permits program, writing discharge permits, during this time he also was involved with pretreatment, sludge and storm-water issues. In September 1992, Paul began working as the Outreach Coordinator for the Division. In this capacity he is involved in providing technical and operational assistance to all of Utah's wastewater facilities. Additionally he does the process reviews for all proposed wastewater facilities within the State. He holds wastewater certifications in small lagoons systems, grade IV collection and grade IV treatment. He is also a licensed professional engineer in the state of Utah. And was the 5 time winner of the clean lunch plate award at Hillview elementary.

Leah Ann Lamb is Assistant Director of the Utah Division of Water Quality (DWQ). She returned to the division in March 2008 after serving for 12 years as the Director of the Department of Environmental Quality's Office of Planning and Public Affairs. In her current position, Leah Ann oversees the Groundwater Protection, Water Quality Management, Engineering and Monitoring functions of the division. She also serves on the National Advisory Council for Environmental Policy and Technology. Leah Ann has over 27 years of experience in environmental policy, planning

and program implementation having served as: a Wetland Biologist in the 404 program for the Detroit District of the Army Corps of Engineers, completing wetland determinations and enforcement actions; Water Quality Director for the Southeastern Utah Association of Local Governments, implementing point and nonpoint pollution control projects; an Environmental Scientist for the Utah Division of Water Quality, completing NEPA reviews for wastewater projects and coordinating outreach and public education events; and Director, Office of Planning and Public Affairs, coordinating planning, public affairs, pollution prevention, small business assistance, and environmental education initiatives for the Utah Department of Environmental Quality (UDEQ). In this role, she also represented Utah in national environmental policy forums by serving in leadership positions with the Environmental Council of the States (ECOS), the Forum on State and Tribal Toxic Action (FOSTTA), the National Pollution Prevention and Toxics Advisory Council (NPPTAC) and the Exchange Network Leadership Council (ENLC). Leah Ann has a B.S. in Natural Resources and M.S. in Water Resources Management from the University of Michigan, Ann Arbor.

Eric McCulley is a Watershed Ecologist with SWCA Environmental Consultants. His work at SWCA has involved projects for wetland restoration, creation of wetlands for wildlife habitat, wetland mitigation, constructed wetlands, stream and riparian restoration, and the coordination of land management practices across political and physical boundaries. Eric has been involved in many phases of wetland work including consulting, planning and design, preparation of construction documents, construction oversight, transplanting of native plant materials, plant installation, and monitoring.

Brian McInerney is currently the Senior Hydrologist with the National Weather Service's office for the State of Utah. He has worked with the National Weather Service for 21 years and is currently the climate and climate change focal point for the Salt Lake City Office. Brian has a Masters of Science in Hydrology and is originally from Chicago Illinois. He currently resides in Park City.

Theron G. Miller has a Bachelor of Science in Fisheries/Aquatic Sciences from Utah State University, a Master of Science in Aquatic Toxicolory from the University of Alberta, and a PhD in Limnology from the University of Alberta. His career has included investigating limnological affects of Las Vegas municipal discharge on Lake Mead, studies of benthic ecology of Colorado River below Hoover Dam, National study for EPA to evaluate accuracy of EPA's water quality criteria including various metals, ammonia, pesticides on stream ecosystems throughout the nation, and a short 8-yr stint in developing and operating a commercial fish farm. More recently, 10 years with the State of Utah DWQ as the nonpoint source coordinator, lakes assessment coordinator and wetlands program coordinator. A year and 5 months ago, Mr. Miller accepted a position with the Jordan River/Farmington Bay Water Quality Council involving continued research on Jordan River ecosystem processes in relation to the ongoing TMDL and on the Great Salt lake wetlands in understanding processes and linkages between sediment chemistry, macroinvertebrate and plant community characteristics and their linkage to waterfowl habitat and food requirements and how these measures relate to beneficial use support.

Ann Neville has worked for Kennecott Utah Copper (KUC) since 1997. She manages the biological resources for Kennecott's 93,000 acre holdings. She also participates on Rio Tinto wide Land Use Stewardship/Biodiversity strategy teams as well as ecosystem services modeling. She is KUC's liaison with many environmental groups around the Great Salt Lake Valley. Ann obtained her Bachelor of Science degree at Weber State and her Master's degree in Marine Ecology at the University of North Carolina at Wilmington.

Julie Peck-Dabling is Salt Lake County's Open Space & Urban Farming Program Manager. She served on the Board of Utah Open Lands from 2004 to 2009 and is currently serving on the Great Salt Lake Advisory Council as the representative for Salt Lake County. In addition, she is finishing her 2nd term on the Recreational Trails Advisory Council for State Parks where she serves as Chair. Julie graduated from Westminster College cum laude and enjoys alumni volunteer work for her alma mater.

Christine A. Pomeroy is an Assistant Professor in the Urban Water Engineering & Sustainability Group in the Department of Civil and Environmental Engineering at the University of Utah, where she teaches courses in hydraulics, open channel flow, stormwater management and design, water distribution system analysis, and urban watershed management. She has more than 15 years of academic and consulting experience in stormwater management, watershed management, permitting and compliance, modeling, GIS applications in water resources,

hydraulics and hydrology. Dr. Pomeroy earned a B.S. in Civil Engineering from Michigan State University in 1995, a M.S. in Civil Engineering in 2004, and a Ph.D. in Civil Engineering in 2007 from Colorado State University. She is active in numerous professional societies including the American Society of Civil Engineers (ASCE), American Water Resources Association (AWRA), and the Water Environment Federation (WEF). Dr. Pomeroy is currently co-chair of the Water Environment Federation task force to update the Manual of Practice No. 23 Design of Urban Runoff Controls. She is a registered professional engineer in Michigan.

Jeremy Roberts has worked for the past 12 years for the Salt Lake Valley Health Department as an Environmental Health Scientist. He enjoys his challenging job responsibilities which include the on-site wastewater program lead and an after hours emergency responder. A Utah native he received a Bachelors of Science degree in 2000 from the University of Utah. He currently sits on the committee that is rewriting the Utah Onsite Wastewater Rule and is involved in the Salt Lake County Development Review Process. He lives in South Jordan, in the home he grew up in, with his wonderful wife and four children. If not at working you will find him on the golf course, somewhere in the mountains or on a boat enjoying his vacation time.

Todd Sherman started Wetland Resources in 1996 and works exclusively on wetland and riparian projects in the Intermountain West. Todd received his Masters from Utah State University's Department of Landscape Architecture and Environmental Planning where his research focused on wetland ecosystems of the Intermountain West, and the planning issues associated with these unique environments. Todd is a certified Professional Wetland Scientist whose experience includes jurisdictional wetland delineation, wetland functional assessment, vegetation analysis and plant community mapping, Section 404 permitting, wetland restoration design, construction supervision and long-term monitoring of wetland mitigation sites, and stream revegetation design. Wetland Resources clients include the Utah Department of Transportation, the Utah Transit Authority, the Idaho Transportation Department, the Federal Highway Administration, numerous large engineering firms, natural gas pipeline companies, Utah ski resorts, private land developers, local municipalities, and other government agencies. Wetland Resources is motivated by a concern for the balance between the growth of our communities and sound natural resource planning. This motivation is supported by a belief that we have the ability to sustain a positive relationship between our communities and the natural environment.

Emy Storheim is the program manager for Salt Lake City's Open Space Lands Program which strives to preserve natural open space, increase access to parks and enhance trail and open space connectivity. Prior to her work in Utah she collaborated with local government agencies and community groups in California, Kentucky and Virginia where she focused on open space conservation, restoration and regional trail connection projects. She has a master's degree in Landscape Architecture from California State Polytechnic University Pomona and earned a bachelor's in Humanities with a concentration in ecology, culture and sustainability from New College of California. She has past work experience in organic farming, landscape design, permaculture, forestry, travel and construction. Her interests include sustainable land management, animal husbandry, earth-works art, and the preservation of natural, cultural and agricultural heritage.

Nicholas von Stackelberg has 17 years experience as a water resources engineer specializing in stormwater and surface water engineering. He received a Bachelor of Science in Civil Engineering from the University of Washington in 1993 and a Master of Science in Biological and Agricultural Engineering from North Carolina State University in 2005. From 1993 to 2003, Nicholas worked in the Seattle area for King County Surface Water Management and two consulting firms on the planning, design, and construction of stormwater and surface water management projects. He has extensive experience in hydrologic, hydraulic and water quality analysis for environmental compliance, planning and design projects. Since 2005, Nicholas has worked for Stantec Consultants in Salt Lake City. He is a registered Professional Engineer in Utah and Washington.