

6th Annual Salt Lake Countywide

Watershed Symposium

September 26-28, 2012

Utah Cultural Celebration Center
West Valley City, Utah



Watershed Planning & Restoration Program
Salt Lake County Government Center
2001 South State Street, Suite N3100, Salt Lake City UT 84190
(801) 468-2711 | www.watershed.slco.org

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Welcome!

As the host of the 6th Annual Salt Lake Countywide Watershed Symposium, Salt Lake County welcomes its community of water stewards and environmental advocates. This free 3-day event is made possible through collaboration with numerous individuals and agencies. In particular, we would like to thank the presenters and field trip leaders for their willingness to share their experience and expertise with us—this event would not be possible without them. Additionally, we would 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 encourage a comprehensive review of the current state of our watershed, and facilitate discussions between environmental advocates, policy makers, teachers, students, water quality experts, the general public, and those working in related professions. Feature presentations, field trips and workshops—from general interest to technical—explore a broad scope of watershed issues.

In order to assist in future efforts, please take a moment to fill out the Comment Card included in the packet. Your feedback and suggestions are greatly appreciated.

Thank you and enjoy!

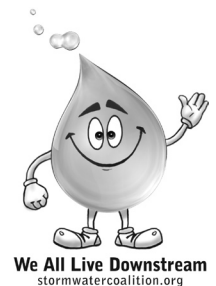
Salt Lake County Watershed Planning & Restoration Program

Marian Hubbard, Watershed Planner/Scientist

Bob Thompson, Watershed Planner/Scientist

Lynn Berni, Watershed Planner/Scientist

Megan Walsh, Watershed Planner/Scientist



Schedule

WEDNESDAY September 26, 2012			
Time	Activities		
8:30 - 9:30	Check-in/Registration		
9:30 - 9:50	<p>Opening Comments, Mayor Peter Corroon, <i>Salt Lake County</i></p> <p>Keynote—Integrating Land Use Planning with Water Resources: Challenges, Opportunities and Observations from the Streambank Patrick Leary, <i>Salt Lake County Public Works (Great Hall)</i></p>		
Room	Great Hall	Room 101/102	Room 104/105
10:10 - 11:00	<p>Mountain Transportation Study</p> <p>Andrea Pullos <i>Salt Lake County Engineering</i></p> <p>Jon Nepstad <i>Fehr & Peers</i></p>	<p>Navigating Section 404 Clean Water Act Permitting</p> <p>John Derinzy <i>U.S. Army Corps of Engineers</i></p>	<p>Volunteer-Citizen Participation in Riparian Forest and Bird Conservation</p> <p>Carolina Roa <i>Tracy Aviary</i></p> <p>Russell Norvell <i>Div. Wildlife Resources</i></p>
11:15 - 12:05	<p>Can the Public Monitor Water Quality? Utah Water Watch Program</p> <p>Brian Greene <i>USU Extension Water Quality</i></p>	<p>Planting Success of Riparian Shrubs and Trees on an Urban Stream Restoration</p> <p>Eric McCulley <i>ENVIRON</i></p>	<p>A Rolling Current in the Jordan River: Causes and Solutions</p> <p>Ed Kern, <i>Brigham Young University</i></p>
12:05 - 1:35	LUNCH BREAK		
1:35 - 3:30	<p>Wastewater Facilities in Salt Lake County: Current Treatment Approaches and Planning for the Future—A Panel Discussion</p> <p>Panel Members:</p> <p>Tom Ward, <i>Salt Lake City Water Reclamation Facility</i> Tom Holstrom, <i>Central Valley Water Reclamation Facility</i> Garland Mayne, <i>Jordan Basin Water Reclamation Facility</i> Lee Rawlings, <i>South Valley Water Reclamation Facility</i></p> <p>Moderator: Karen Nichols, <i>HDR</i></p>		

THURSDAY September 27, 2012			
Time	Activities		
8:30 - 9:30	Check-in/Registration		
9:30 - 9:50	Keynote—“Water: Private Rights, Public Resource—What Does it All Mean?” Boyd Clayton, <i>Utah Division of Water Rights (Great Hall)</i>		
Room	Great Hall	Room 101/102	Room 104/105
10:10 - 11:00	New Invaders in Salt Lake County Sage Fitch <i>Salt Lake County Weeds Program</i>	Definition and Assessment of Great Salt Lake Health Erica Gaddis <i>SWCA</i>	Jordan River Total Maximum Daily Load (TMDL) Phase 1 Hilary Arens <i>Utah Division of Water Quality</i>
11:15 - 12:05	Prior Appropriation Doctrine vs. Water Conservation Wendy Bowden Crowther <i>Parsons Behle & Latimer</i>	Low Impact Development at Daybreak Community Tyler White <i>Perigee Consulting</i>	Organics in Sediments of Jordan River: Sources and Long Term Effects on Water Quality Ramesh Goel <i>University of Utah</i>
12:05 - 1:35	LUNCH BREAK		
1:35 - 2:25	Environmental Education Overview and Teaching Techniques Workshop Kristen Bonner <i>Utah Society for Environmental Education</i>	Climate Change & Salt Lake City's Water Supply Tim Bardsley <i>Western Water Assessment</i> Laura Briefer <i>Salt Lake City</i>	Assessing Economic Benefits/Costs of Nutrient Criteria Implementation Nick von Stackelberg <i>Utah Division of Water Quality</i>
2:40 - 3:30		Snow and Water Resources of the Great Salt Lake Basin Court Strong <i>University of Utah</i>	Utah's Online State Water Quality Database Jim Harris <i>Utah Division of Water Quality</i> *Attendees please bring laptop*

FRIDAY September 28, 2012	
Time	Field Trips
	Field Trip Info: <ul style="list-style-type: none"> • Must be registered to attend • Bring your own food and drink • Dress for the outdoors (walking shoes and sun protection recommended) • Driving directions and trip details at www.watershed.slco.org
8:30-11:30	Urban Agriculture Tour Guide: Amy Barry, <i>Salt Lake County Open Space</i> Vans will leave promptly at 8:30am, meet at North Building entrance of the Salt Lake County Gov't Center 2001 South State Street, Salt Lake City, UT 84190
8:30-11:00	Jordan River Riparian Restoration Sites Guides: Eric McCulley, <i>ENVIRON</i> Jenni Oman, <i>Salt Lake County Watershed</i> Vans will leave promptly at 8:30am, meet at North Building entrance of the Salt Lake County Gov't Center 2001 South State Street, Salt Lake City, UT 84190
1:00-3:30	Green Infrastructure @ University of Utah Guides: University of Utah Water Research Group: Steve Burian, Christine Pomeroy, Dasch Houdeshel, Austin Orr, Kristianne Sandoval Vans will leave promptly at 1:00pm, meet at North Building entrance of the Salt Lake County Gov't Center 2001 South State Street, Salt Lake City, UT 84190

Key

- Non-technical
- Technical

Opening Comments

Mayor Peter Corroon

Salt Lake County

2001 South State Street, Suite N2100, Salt Lake City UT 84190

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Keynotes

Integrating Land Use Planning with Water Resources: Challenges, Opportunities and Observations from the Streambank

Patrick Leary, Public Works Director

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The professional discipline of land-use planning involves training and education to navigate the challenging statutes, ordinances, best practices, community interests and ownership rights for property development. Individual property rights and government regulations are often in conflict, and with property rights viewed as “sacrosanct” in our Western American culture, are often controversial. Water, the lifeblood of our communities, fundamentally underlies our capacity for development. However, the agencies responsible for land-use planning and development are not the same agencies with responsibilities for water and water resources. This separation of responsibilities is designed to allow appropriate expertise to focus on specific disciplines, but has the secondary impact of creating blinders within those disciplines. While land-use agencies and water resource agencies work together, and often very well, the broader perspective about land-use and water resources is sometimes lost, or at best, is relegated to being “someone else’s responsibility.” This separation of responsibilities and the potential problems that arise as a result argues for a need to integrate at a deeper level water issues with land-use decision-making.

Water: Private Rights, Public Resource—What Does it All Mean?

Boyd Clayton, Deputy State Engineer

Utah Division of Water Rights

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Who would have thought the basic tenet of Utah water law (all water both above and below the ground is the property of the public) would be at the center of a major fishing conflict. Whether we drink it, grow or make something with it, ski on it in one state or another, or simply wish to look at it and hear its sounds, water is a part of everything we do. Without water there is no life as we know it, and no fuel for the economic development engines which bring jobs, security, and goods to our communities. Federal and State law have created the framework under which public enjoyment and private rights-to-use have so delicately shared access to our most precious natural resource. Regardless of whether you think this “building” is quite habitable, unstable, in need of remodeling, or should be razed and re-built, it is important to understand our current water laws and policies so that we may effectively build a future we can continue to enjoy. Sooo....let’s talk about it!

Session Abstracts (listed alphabetically by title)

Assessing the Economic Benefits and Costs of Nutrient Criteria Implementation

Nicholas von Stackelberg, Environmental Engineer
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The Utah Division of Water Quality (DWQ) is funding a study to quantify the economic benefits and costs of implementing nutrient criteria for surface waters in Utah. Human-caused nutrient inputs of nitrogen and phosphorus to the nation's waters have been identified as significant threats to aquatic life and recreational uses. In response, the US Environmental Protection Agency has called upon States to develop and adopt numeric nutrient criteria. Understanding the economic implications associated with the implementation of nutrient criteria is important for informing decisions to protect water quality. A comprehensive evaluation of the values that people derive from their direct and indirect uses of Utah's water bodies as well as the value that residents place on preserving and stewarding the state's surface waters (i.e., non-use value) was conducted. Econometric modeling methods that utilized the results from two mail surveys sent to randomly selected households in Utah were employed to estimate the economic benefits of minimizing excess nutrient pollution. In addition, a benefit cost analysis of implementing statewide nutrient standards was performed. The economic cost categories that were evaluated include: wastewater treatment plant upgrades, stormwater source control and treatment, nonpoint source pollution (i.e. agriculture) control and treatment, and regulatory agency administration costs. The economic benefit categories include recreation value, non-use value (i.e. quality of life), property value, and drinking water treatment cost savings.

Can the Public Monitor Water Quality? Utah Water Watch Volunteer Monitoring Workshop

Brian Greene, Utah Water Watch Coordinator
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When asked who monitors water quality the average person often thinks of a scientist in a laboratory. In fact a wide variety of professionals from local, county, and state government monitor water quality in Utah. So where does the public fit in and why do we need volunteer help? Many areas are in need of additional monitoring and by involving the public we can collect more data while increasing public knowledge about water quality. A network of dedicated volunteers can be allies aiding in the management of water. Utah Water Watch is a volunteer water quality monitoring program that teaches volunteers about watershed science and how to collect credible data on lakes and streams. Utah Water Watch is a partnership between Utah State University Water Quality Extension and the Division of Water Quality to coordinate and promote volunteer monitoring. Brian Greene, the program coordinator, will talk about where and what volunteers monitor, show examples of volunteer collected data, and provide hands on experience for the audience to use the monitoring equipment.

Climate Change and Salt Lake City's Water Supply

Tim Bardsley, Utah Liaison
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Laura Briefer, Water Resources Manager
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Global climate models agree that northern Utah will become warmer and that the timing of snow accumulation and runoff will change. From this we can derive that climate change will have an impact on our water resources and function of our watersheds, impacting water demands, availability, and quality. Salt Lake City Department of Public Utilities, in partnership with Western Water Assessment and others, is conducting research on the science, and the planning processes, associated with climate change scenarios. This workshop will focus on what we know, and the uncertainties, of planning for water resources in a changing climate.

Definition and Assessment of Great Salt Lake Health

Erica J. Brown Gaddis, Water Resources Scientist
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Great Salt Lake is one of the most important and least understood ecosystems in Utah, and possibly North America. It is influenced by an array of natural and human factors resulting in a dynamic and complex web of natural habitats and human uses. In its current form, it is of worldwide importance for migratory bird populations, and its shorelines represent some of the premier wetland areas in the United States. It is home to the most significant (largest) populations of *Artemia franciscana* (brine shrimp) in the Western hemisphere. This project, commissioned by the Great Salt Lake Advisory Council, comprises a definition of health, an assessment of current health, and an identification of critical future stresses to Great Salt Lake health. Published in January 2012, the definition of health was developed using the Conservation Action Planning (CAP) framework, drawing on the scientific expertise of a Science Panel made up of prominent scientists with extensive experience and knowledge of the varied Great Salt Lake habitats and species. Ecological health was based on the lake's current physical form, including dikes and causeways that segment the lake into four bays (Gilbert Bay, Farmington Bay, Bear River Bay, and Gunnison Bay) and impounded wetlands created to increase habitat for waterfowl and other birds. Eight ecological targets were identified for Great Salt Lake up to an elevation of 4,218 feet: system-wide lake and wetlands, open water of bays, unimpounded marsh complex, impounded wetlands, mudflats and playas, isolated island habitat for breeding birds, alkali knolls, and adjoining grasslands and agricultural lands. Collectively, these eight ecological targets capture the full biological diversity of the lake ecosystem and support an array of significant species, including brine shrimp, brine flies, and birds. Health is defined separately for each ecological target found within each of the four distinct bays of Great Salt Lake. Based on the definition of health developed through this project, most ecological targets surrounding Great Salt Lake are in good health; although, some of the ecological targets had a high level of uncertainty due to insufficient data and could not be ranked. Several habitats are in poor or fair health, including alkali knolls around Bear River, Farmington, and Gilbert bays, the impounded wetlands around Farmington Bay, and the open water of Gunnison Bay. Although the lake's current health is relatively good, future stresses are projected to severely threaten the integrity of Great Salt Lake and the ability of migratory birds to use the lake ecosystem. The three highest ranked stresses to Great Salt Lake ecosystems included reduced lake levels, the spread of *Phragmites*, and additional permanent loss of alkali knolls. This project represents a first iteration of a definition and assessment of health for Great Salt Lake. The adaptive management tool developed through the CAP process could be periodically updated by a body of active research scientists and used by lake managers in broad-scale lake planning. Download the report at <http://www.gslcouncil.utah.gov/grants.htm>.

Environmental Education Overview and Teaching Techniques Workshop

Kristen Bonner, Professional Development Co-Coordinator
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The Utah Society for Environmental Education (USEE), a 501 (c) 3 nonprofit, has been a statewide leader in promoting high quality environmental education in Utah since 1981. USEE encourages environmental literacy by teaching Utahans how to think, not what to think, about the environment. To achieve this goal, USEE serves as an umbrella organization and information resource for environmental educators, K-12 teachers, higher education, and the Utah community at large. These efforts will help ensure economic, social, and environmental sustainability for Utah. USEE aims to create an environmental literate society and will be hosting a workshop that outlines environmental education and its application in varying capacities.

Jordan River Total Maximum Daily Load (TMDL) Phase 1

Hilary Arens, Jordan Basin Coordinator
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The first phase of the Jordan River Total Maximum Daily Load (TMDL) water quality study has been completed. This phase of study has identified excessive levels of organic matter as the main pollutant of concern contributing to the dissolved oxygen impairment. As of now, the document has gone through a technical advisory committee, scientific review committee and public review process, and will be submitted to EPA. This presentation will provide the latest information including significant findings, ongoing water quality improvement efforts, and future steps in the TMDL process.

Low Impact Development at Daybreak Community

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Daybreak is a master planned community that has employed measures that impact the hydrologic cycle and improve sustainability of the development. Runoff reduction, infrastructure footprint reduction, native plantings and landscaping and water quality control strategies are measures that have been used to reduce the impact of the development. The effectiveness of measures will also be discussed. Because the development retains up to the 1% chance exceedance storm event, a study to understand real responses of typical watersheds at Daybreak and how they correlate to modeled, standard runoff coefficients is being conducted.

Mountain Transportation Study

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Jon Nepstad, Principal
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Salt Lake County is conducting the Mountain Transportation Study to evaluate transportation solutions that will better facilitate the public's access to Big and Little Cottonwood Canyons across all seasons while protecting the county's water source, wildlife, and other natural values. The Wasatch Canyons Tomorrow Study called out a

need to study alternate transportation and parking issues in the two canyons. Two studies are being conducted, one specifically to deal with current parking issues, and the other to bring the various stakeholders together and determine the problems and opportunities transportation options could have to Big and Little Cottonwood Canyons. Both modified parking and transportation changes could affect the watershed and the overall water quality in the canyons.

Navigating Section 404 Clean Water Act Permitting with the Army Corps of Engineers

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The Army Corps of Engineers is tasked by the Environmental Protection Agency with evaluating permit applications under Section 404 of the Clean Water Act. If a proposed project places fill or alters a wetland, lake, river, stream, creek, or other jurisdictional water that flows to a Traditional Navigable Water, then a permit is required under Section 404 of the Clean Water Act. At times, the permitting process can seem confusing as Corps policies and guidance are constantly evolving through rule making or court decisions. In Utah there are four categories of permits which can be used to help applicants achieve their project goals. Those permits include two types of General Permits: the Programmatic General Permit 40 Stream Alteration Permit and the Nationwide Permits as well as two types of Standard Permits including the Letter of Permission for impacts less than 1 acre and Individual Permits which include a Public Notice process. Each of these permits requires various level of information before the Corps can authorize the applicants work in a jurisdictional water. Having a clear understanding of the information required to issue a permit and the steps involved in the permitting process can help expedite processing of a permit and get the applicant's project underway.

New Invaders in Salt Lake County

Sage Fitch, Noxious Weed Specialist
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In the last several years, invasive species have gained recognition as one of the single greatest threats to the biodiversity and integrity of natural ecosystems. Three such invasive species, not widely known in Utah, have become established and now pose a serious threat to our watersheds. Garlic Mustard, although a fairly new invader to Utah, it is not new to North America. Throughout the east coast, Midwest, and Canada, it is a significant problem and a serious threat to forest understory plant habitat. In Utah, it has rapidly been creeping its way across forested areas throughout Summit County and the Park City area, and is now found in several locations on the eastern fringe of Salt Lake County. Medusahead, a new invader to Salt Lake County, is an extremely competitive grass species. Found in Cache and Box Elder Counties, it recently showed up at Camp Williams and has become a priority weed species for the Salt Lake County Weed Control Program. Rush Skeletonweed, although not found in Salt Lake County, has invaded Box Elder Counties and is extremely difficult to control once established. Join Sage, Salt Lake County Noxious Weed Specialist, as she discusses in more detail these new invaders, how to identify them, impacts, best management practices, and why they should be on everyone's radar.

Organics in Sediments of Jordan River: Sources and Their Long Term Effects on River Water Quality

Dr. Ramesh Goel, Associate Professor

University of Utah, Department of Civil and Environmental Engineering

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More than 50 % of U.S. surface waters are still contaminated due to the input of organics and nutrients from various point and non-point sources. Under section 303(d) of the clean water act, state, territories and tribes are required to develop lists of impaired waters that are polluted based on the standards set by state and federal regulatory agencies. A Total maximum daily load (TMDL) calculation for specific pollutants of concern is performed to determine the amount of pollutants a water body can receive without questioning the long-term sustainability of that water body. A complete TMDL study for dissolved oxygen (DO) is not needed directly but it is needed for pollutants such as organics which contribute to DO depletion in the surface water. Mechanistically, the main factors contributing to DO dynamics are consumption of DO in the water column and sediments and the addition of DO to the water column through physical re-aeration. Understanding the type, fate and dynamics of organics in sediments is vital to get a complete picture on the DO sinks in any river body. DO consumption in sediments due to various biogeochemical activities is termed as sediment oxygen demand or SOD. We used in-situ tests to evaluate SOD at various places in Jordan River. However, now the big question is about the type and degradability of organics present in Jordan River Sediments. Our current efforts are focusing on this aspect in which case we are getting 20-cm sediment core samples from the site where SOD studies were done and trying to speciate these core samples in terms of volatile solids and total organic carbon. The results are exciting and will directly help the Utah Division of Water Quality and different Stakeholders in their efforts to develop TMDL and manage the river. Past and results from ongoing efforts will be presented at this symposium.

Planting Success of Riparian Shrubs and Trees on an Urban Stream Restoration in Utah

Eric McCulley, Senior Associate Ecologist

ENVIRON International Corporation

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The main goal of the Audubon/Tree Utah Migratory Bird Habitat Restoration Project is to increase the density and areal coverage of native shrub and tree complexes along Willow Creek to support neotropical migratory bird habitat. This project has involved modifying the hydrology of an urban stream to create a meander channel that parallels the Jordan River, Utah. The financial support for this project has been provided by a variety of sources, but the Sharon Steel Natural Resource Damage Assessment Settlement provided the majority of funding. This settlement was created to compensate for injury and loss of migratory bird habitat that resulted from the release of hazardous materials from the Sharon Steel Superfund Site. Property acquisition by the Utah Reclamation, Mitigation and Conservation Commission, a federal organization was critical. Great Salt Lake Audubon and Tree Utah, local non-profit organizations, have been responsible for improving the habitat and monitoring the success of shrub and tree plantings along this newly established stream segment, which drains a city of over 40,000 people. A group of volunteers and professionals have developed a monitoring program to look at success of plantings, habitat conditions, and bird use in restored areas. This program will be used to help managers of the property to make decisions within an adaptive management framework. The preliminary results of planting success indicate that overall survivorship of shrubs was 42% in one planting area and 74% in another area, after three years of establishment. Managers of the site have determined that supplemental irrigation of shrubs increased success drastically. Tree survivorship is very low when small seedlings are planted into established pasture sod areas even with irrigation, but when containerized willow and

cottonwood trees were planted along the banks of a newly excavated stream channels survivorship was very high, between 50 and 75 percent. Bird surveys were completed in the spring and early summer of 2011 and have been compared to baseline surveys that were completed in 1997. Results of the bird surveys indicate that the site is used by some neo-tropical migratory birds, but nesting was limited to generalist species.

Prior Appropriation Doctrine vs. Water Conservation

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Utah Water Law, as in most of the arid west, is based upon the Prior Appropriation Doctrine. Two of the primary tenants of the Prior Appropriation Doctrine are “first in time is first in right” and “use it or lose it.” The Doctrine was developed to encourage parties to divert water from its natural source and place it to economically beneficial use. The Doctrine protects those who divert water for use and punishes those who fail to place their water rights to beneficial use. As such, the existing body of law is often in conflict with modern conservation values. As society adopts water conservation goals, we need to understand the legal roadblocks that may be in the way. This presentation will focus first on the basics of the Prior Appropriation Doctrine in order to understand how water law was developed in the West and why it may be counter to conservation goals. Next, the presentation will address water conservation – what conservation is and the purposes water conservation may serve. Finally, we will consider example of the conflict between the Prior Appropriation Doctrine and conservation and how those conflicts may be addressed. Such examples will include stormwater capture and use (rain barrels); in-stream flow rights; and water for the Great Salt Lake.

A Rolling Current in the Jordan River: Causes and Solutions

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Two kayakers drowned in the summer of 2010 in a dangerous current that develops downstream from a concrete pad beneath the Winchester Drive Bridge over the Jordan River in Murray. The dangerous current is often referred to as a “roller” due to the fact that the current flows upstream at the water surface and appears to revolve or “roll” into itself. A “roller” is caused by a hydraulic phenomenon called a submerged hydraulic jump. There are many river structures across the nation that develop this type of rolling current where several hundred deaths have occurred. The concrete apron on the Jordan River is a case study that is representative of many river structures that cause “rollers”. A scale model of this structure was constructed in the fluid dynamics laboratory at BYU. The model has given us insight that has helped us to understand the factors that may have caused this current to develop. The lessons learned from the model can help us to prevent the occurrence of “rollers”, and remediate structures that develop this dangerous condition.

Snow and Water Resources of the Great Salt Lake Basin: Perspectives from the Past, Projections for the Future

Courtenay Strong, Assistant Professor
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Although there is a strong scientific consensus that human-generated increases in greenhouse gases are responsible for most of the global warming over the past several decades, projecting the future fate of snow and water resources in the Great Salt Lake Basin remains a major scientific challenge. This talk reviews current understanding of global and regional climate change and variability and examines the range of projections for northern Utah during the coming century. It will draw heavily on the forthcoming Southwest Climate Assessment Report, which will be issued this summer and summarizes current understanding of past, present, and future climate change over the southwest United States. The talk will also examine important regional climate wildcards, such as dust and its potential contribution to the timing of snowmelt and intensity of runoff in the Great Salt Lake Basin.

Utah's Online State Water Quality Database

Jim Harris
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This presentation will introduce and briefly demonstrate the Utah Division of Water Quality Database, complete with recent enhancements and customization. Unlike the previous database management system, Utah's WQX Database is accessible through a Web site with a very user-friendly interface. After a brief summary of the history of the US EPA and Utah DWQ database management systems, the audience will be guided through some of the key functions of this new database website. These functions include searching for existing Monitoring Locations, exporting Monitoring Location information to Excel, viewing how data-rich a dataset is, using database tools to graph and summarize data online, as well as searching for and exporting water quality data in various formats. Following the demonstration, discussion will include public access, data flow and future enhancements planned for the database.

Attendees should bring their own personal laptops so that they may login along with the speaker*

Volunteer-Citizen Participation in Riparian Forest and Bird Conservation

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Hal Robins
Volunteer Citizen Project at City Creek Canyon

Kathleen Robins
Volunteer Citizen Project at City Creek Canyon

In 2011, we started a volunteer bird-monitoring program in City Creek Canyon to document possible fluctuations of bird richness (number of species), abundance (number of individuals) and density (number of individuals / area) in response to three small treatment plots intended to reduce the fuel (derived from vegetative material) in the lower part of the forest. We will develop the following components: 1) City Creek Canyon in a statewide context under the perspective of policy and decision-makers; 2) the value of

citizen-science projects as a multi-way learning process, seen from the volunteer perspective; and 3) share the data generated through a cooperative effort with Volunteer Citizens. The overall process involved: a) Volunteer training; b) conduct bird-surveys (point-transect method), c) continuous assessment of methods and d) produce a comparative analyses of data from 2010 - 2012 in treatment and reference plots located in City Creek. Preliminary qualitative data do not exhibit difference between treatment and control plots, however the analyses is still underway. Some low canopy species that exhibited changes in abundance were Lazuli Bunting (*Passerina amoena*), and Black-capped Chickadee (*Poecile atricapillus*). We expect to find changes especially in abundance of ground foragers between reference and treated plots. The inherent variability associated with site and between-year variations, weather, and other variables need to also be considered, to interpret the potential responses of birds to the treatment.

Wastewater Facilities in Salt Lake County: Current Treatment Approaches and Planning for the Future—A Panel Discussion

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Moderator:

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During the development of the 2009 Salt Lake Countywide Water Quality Stewardship Plan (WaQSP), a planning effort was conducted to provide descriptions of existing municipal wastewater treatment facilities within the Salt Lake Valley watershed. Salt Lake County is the area-wide water quality manager for the Salt Lake County watershed and is required to maintain the water quality management plan. Along with this effort, current and future regulatory standards were reviewed, emerging trends in technologies were identified and discussions with wastewater facility managers, regulating agencies and stakeholders were held to coordinate planning decisions aimed at protecting water quality within the watershed. Recommendations from the 2009 WaQSP included: formalizing the planning and permitting process; preparation of regional 2050 build out flow projections and sewer capacity model; integration of the environmental and public processes in facility planning; and conducting periodic evaluations of ongoing wastewater planning within the watershed. This session will allow each panel member to provide updated information on facility operations and processes, discuss recent trends in flows, and planned facility expansions and improvements. Challenges facing operators of municipal wastewater plants will be discussed regarding potential nutrient criteria standards, reuse, rates and impact fees, asset management and aging plant facilities. Panel members may also address adjacent property management challenges, sustainability and energy neutral practices and resource recovery technologies. In addition, the 2009 recommendations will be discussed including the need for countywide area master planning efforts to accommodate future growth and potential funding for the future planning efforts.

Field Trips

Urban Agriculture in Salt Lake County

Amy Barry

Salt Lake County Open Space & Urban Farming Program
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This field trip will highlight four very different examples of urban agriculture in Salt Lake County. As participants will learn, urban agriculture can take place almost anywhere—in raised beds build on dilapidated tennis courts, in landscapes around buildings, or in long-neglected fields. The relationship between water sources and sustainable farming will be explored as we visit sites with canal water sources, well sources, and even a solar-powered drip irrigation system. The many benefits of urban agriculture will also be discussed, such as providing beneficial uses for underutilized land; reducing urban heat-island effects; availability of fresh, highly nutritious, locally grown food; reducing carbon footprints; and providing economic opportunities for local farmers.

Walking Tour of Jordan River Riparian Restoration Sites

Eric McCulley, Senior Associate Ecologist
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Salt Lake County Watershed Planning & Restoration
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The Jordan River flows through the center of the Salt Lake Valley connecting the two largest water bodies in Utah, Utah Lake and Great Salt Lake. Water from the Jordan has historically been used to provide for the many needs of Salt Lake Valley residents through irrigation of agriculture and other human uses. As a result, the river has been subjected to many modifications to its channel, vegetation, and flows over the last century or more. These stressors on the river ecosystem have not been without cost and the Jordan River is subject to many of the issues that plague urban water bodies worldwide. In particular, a wildly unnatural flow regime, caused by the opening/closing of the Utah Lake gates, is one stressor that makes even the most conservative riparian restoration challenging. Numerous riparian restoration and reclamation projects have been implemented along the river to improve the quality of habitats. On this trip, we will visit several restoration projects that have been completed on properties owned and managed by land trusts, non-profits, private interests, municipalities, and agencies. Participants will see examples of different restoration practices, with particular focus on how to make riparian restoration successful in the midst of rapidly advancing urban development.

Green Infrastructure at the University of Utah

Dr. Steve Burian
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Dr. Christine Pomeroy
christine.pomeroy@utah.edu

Urban Water Research Group
University of Utah, Civil and Environmental Engineering
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This field trip will focus on stormwater green infrastructure research and applications at the University of Utah, led by the UU Urban Water Research Group. We'll start with an overview of Low Impact Development (LID), green infrastructure and the stormwater problem, then break into groups and rotate

between sites. Discussion afterwards will discuss current and potential future and research and design, what works and does not work, and what are the roadblocks to implementation.

Site 1: Bioretention at the CTI Humanities Building

Great example of an LID bioretention installation backed up by a traditional stormwater overflow system for large storm events. We will talk about infiltration (in contrast to garden-centric exfiltration). We will also talk about unexpected runoff sources that get “treated”.

Site 2: MCE-CME Building Rain Gardens

This site is a great example of how bioretention systems can look and perform in our climate and not require additional irrigation to maintain the vegetation. There is no supplemental irrigation and the plants are doing great. The site drainage is fairly large so the use of a deeper storage reservoir in the bioretention unit will be discussed.

Site 3: Sutton Building Green Infrastructure

This site contains several green infrastructure elements including pervious concrete, green roof, and infiltration basin. The discussion at this site will extend from the details of the design to include cost, durability, risk management, and performance.

Bios

Hilary Arens works as the watershed coordinator for the Salt Lake Valley for the Utah Division of Water Quality. Over the years, she has worked in watershed management in Vermont, Colorado and Alaska, and as a volunteer with water groups in Vermont, Oregon and Utah. Hilary received her B.A. in biology from Colby College (Maine) and her M.S. in watershed science from Colorado State University. An avid boater, skier and cyclist, she and her husband enjoy bringing their toddler twins on adventures where few toddlers go.

Tim Bardsley serves as Utah liaison for the Western Water Assessment (WWA), a NOAA-funded Regional Integrated Sciences and Assessments program that uses scientific expertise on climate and hydrology to help improve water reliability in the Intermountain West in light of the impacts of climate variability and change. Tim holds a bachelor's degree in civil engineering from the University of Colorado-Boulder and a master's in hydrology from the University of Nevada-Reno. He has spent the past twenty years working in hydrology and environmental sciences in Colorado, Utah, Nevada, and California. Prior to joining WWA, Tim worked as a hydrologist with the Natural Resources Conservation Service Utah Snow Survey Office.

Amy Barry received an M.S. in environmental studies from the University of Montana and an M.S. in political science from the University of Utah and is currently involved in many projects that merge her interests in the environment and public policy. Her studies have focused land use issues and the public policy paradigms that drive change. Amy's fieldwork was conducted on a mitigation wetland area on the shore of the Great Salt Lake conducted a noxious weed survey and created an integrated weed management plan that focused on alternative and natural weed control to restore more productive habitat. The continuation of her studies focused on the difficulty in achieving policy shifts with regards to land use and conservation issues. In addition to her work with the Salt Lake County Open Space Program Amy spends her time serving on the Sugar House Community Council, Sugar House Farmers Market and the Salt Lake City Parks, Natural Lands, Trails and Urban Forestry Advisory Board.

Kristen Bonner is passionate about helping people learn about our amazing natural world. She has a B.S. in environmental studies from the University of Utah with an emphasis in biology teaching, and has worked in the field of informal science education for the last eight years. Kristen currently co-coordinates the environmental education professional development programs for the Utah Society for Environmental Education.

Laura McIndoe Briefer is the water resources manager for Salt Lake City Department of Public Utilities (SLCDPU), a municipal water supplier responsible for the provision of drinking water to more than 400,000 people in the Salt Lake Valley. Laura has worked at SLCDPU for the past four years, and has 18 years' experience in natural resource and environmental professions in the public and private sectors. She has a degree in environmental studies from the University of California at Santa Barbara, and is a graduate student at the University of Utah studying public administration. Laura spends much of her free time running, cycling, and skiing in the Wasatch foothills and mountains with her husband and two children.

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's career spans more than a decade during which he has worked in design engineering, as a scientist at Los Alamos National Laboratory, as a professor at the University of Arkansas and the University of Utah, and as a director of an engineering design and sustainability consulting firm he co-founded. Dr. Burian received a Bachelor of Science in Civil Engineering from the University of Notre Dame, and a Master of Environmental Engineering and a Doctorate in Civil Engineering from The University of Alabama. Dr. Burian has expertise related to the engineering of sustainable urban water resources systems, including water supply, stormwater management, flood control, and wastewater collection. He has taught courses in sustainable urban water engineering, stormwater management and design, water management, professional practice and design, sustainable infrastructure, hydrology, hydraulics, sustainable design, flood modeling, and hydrologic field measurements. Specialty areas of research and consulting include integrated urban water management, low-impact development, green infrastructure design, stormwater management, flood risk modeling, vulnerabilities and adaptation strategies for urban water systems, and the water-energy nexus. Steve's research projects have been funded by national laboratories, EPA, NSF, DOD, DOE, state departments of transportation, and private industry. His work has resulted in more than 50 authored or co-authored peer-reviewed publications. Dr. Burian currently is an associate director of the Global Change and Sustainability Center and the co-director of sustainability curriculum development at the University of Utah. He is actively involved with several professional societies including ASCE, AWRA, AWWA, WEF, AGU, AMS, and ASEE and is currently chairing the ASCE Rainwater Harvesting technical committee. Dr. Burian is a registered professional engineer in Utah.

Boyd Clayton is deputy state engineer at the Utah Division of Water Rights, an agency of Utah State Government where he has worked on water and water right issues for over 30 years. He is a licensed professional engineer with a B.S. in civil engineering from the University of Utah. Boyd loves Utah, its people, and the water which makes life here possible and enjoyable.

Peter Corroon became Salt Lake County mayor in the 2004 election, and since then he has worked to foster open, honest and ethical government. At a time when Salt Lake County is seeing rapid growth, he emphasizes "planning, not politics" to manage this growth. His fiscally conservative policies will make county government both more efficient and more environmentally sound. Mayor Corroon believes that government should be accessible to all citizens. He regularly holds open-door meetings for the public and has made promoting diversity a priority. A champion of small business, his Up Grade initiative and economic development efforts are improving lives throughout the county. Mayor Corroon also serves as a board member for the National Association of Counties, The United Way, Envision Utah, Utah Technology Council, Economic Development Corporation of Utah, and Salt Lake Area Chamber of Commerce, which recently awarded him "Public Official of the Year." He holds a B.S. in civil engineering from Carnegie Mellon University, Pittsburgh; an M.S. in real estate finance and investment from New York University; and a J. D. from Golden Gate University. Mayor Corroon and his wife, Amy, have three children. His twin brother Christopher also lives in Salt Lake.

Wendy Bowden Crowther is a shareholder and member of the Environmental, Energy and Natural Resources Department at Parsons Behle & Latimer. Her practice focuses on natural resources law with an emphasis on water law and related litigation. Ms. Crowther represents municipalities, water conservancy districts, special service districts, irrigation companies and private water right holders. Ms. Crowther has represented water right holders before the Utah state engineer, the district court and the federal court. She has completed numerous water right transfers and is experienced in reclamation law and condemnation litigation.

John Derinzy began his federal service by joining the U.S. Air Force as a law enforcement specialist. After serving for four years John returned to Michigan, his home state, and returned to school attending Michigan State University. John graduated with a B.S. in natural resource based recreation management. His career with the Corps of Engineers started as a student worker at a large reservoir, Lake Sakakawea, in North Dakota as a seasonal park ranger. After graduating college, he traveled to Colorado to ski and snowboard, working whatever type of job he could find that would allow him to pursue these hobbies each day. Although getting more than 100 skiing days per year, he realized it wasn't a good career maker and decided to return to employment with the Corps. He has broad experience as a park ranger and natural resource specialist working for Michigan State Parks, Colorado State Parks, Douglas County Open Space (Colorado), and Corps lakes in Pennsylvania, North Dakota, Washington and Oregon. For the last three and a half years John has worked as a project manager in the Corps' Regulatory Division. Hobbies include hiking, camping, photography, paragliding, and travel.

Sage Fitch has over 10 years of experience in noxious weed management, education, and project coordination both in the Pacific Northwest and Intermountain West. Since 2004, Sage has served as noxious weed specialist for Salt Lake County and chair of the Bonneville Cooperative Weed Management Area. Sage is currently responsible for grant writing, project coordination, weed awareness and education and works with multiple partners throughout Utah. Before moving to Utah in 2004, Sage worked as a weed specialist for the King County Noxious Weed Program in Seattle, Washington. She holds a Bachelor of Science from Utah State University in horticulture and botany.

Erica Gaddis began her scientific career as a biology and environmental science major at Willamette University, Oregon. She received her M.S. as a Fulbright scholar at Central European University in Budapest, Hungary in 2000 with a focus on ecological design. Her subsequent work in that field included remediation of a polluted urban canal in eastern China and a large natural wastewater treatment system installed in Maryland. Erica received her Ph.D. of Natural Resources from the University of Vermont, Gund Institute for Ecological Economics (GIEE) in 2007. Her dissertation focused on watershed modeling and cost optimization of management practices. Erica returned to her native Salt Lake City in 2006 to raise her family. She is currently employed as a water resources scientist with SWCA Environmental Consultants in Salt Lake City, Utah. While at SWCA, Erica has worked on water resource projects related to Great Salt Lake, the Bear River system, and the Weber River system. Her areas of expertise include watershed modeling and spatial optimization, limnology, water quality analysis, Clean Water Act compliance, nutrient management, assessment of pollution sources, natural wastewater treatment design, and restoration of aquatic systems. Most recently, she managed the Great Salt Lake Health project and is currently managing the Rockport and Echo Reservoir TMDL project and the East Canyon Creek stream restoration project near Park City. In addition to her work at SWCA, Erica also enjoys traveling, spending time with her family, exploring Utah, and working on other research efforts. In 2011, she co-authored the Genuine Progress Indicator Study for Utah. In 2010, she was invited by the United Nations Environment Programme to oversee the development of the Water Chapter of the Fifth Global Environmental Outlook Report, UNEP's flagship publication that was launched at Rio+20 in June 2012.

Ramesh Goel is an associate professor of environmental engineering at the University of Utah. He completed his doctorate from the University of South Carolina and post doctorate from the University of Wisconsin, Madison. He researches in surface water sustainability, wetlands, grey water treatment and decentralized wastewater treatment. His current research projects are funded by National Science Foundation, USEPA, Utah DWQ, Local Municipalities and SIEMENS Water Co. He is the recipient of the Presidential Young Investigator Award in 2010 for his research related to viruses in wastewater treatment plants. He serves on several national committees including research committee at WEFTEC, AEESP. He is also serving as chair of the Utah Wastewater Certification Council.

Brian Greene is the program coordinator for Utah Water Watch, a new state wide volunteer water quality monitoring program. A newcomer to Utah, Brian enjoys using his ecology background to help highlight Utah's amazing aquatic resources. He is based out of Utah State University in Logan.

Ed Kern is a southern California native perusing an M.S. in civil engineering at Brigham Young University, Provo. He is researching the submerged hydraulic jumps that form at low-head overflow structures and modeling potential remediation solutions to eliminate the public hazard while allowing safe passage for whitewater enthusiasts. Ed is a member of the Utah Whitewater Club, the BYU Whitewater Kayaking Club, and the ASCE BYU student chapter.

Jim Harris

Tom Holstrom is the general manager for the Central Valley Water Reclamation Facility in Salt Lake County. Prior to joining Central Valley in 2005, Mr. Holstrom was a consulting civil engineer in Salt Lake County for 27 years, and directed engineering offices for The Keith Companies, Inc. (1999-2005), Thompson-Hysell Engineers, Inc. (1994-1999), and John Carollo Engineers (1992-1994). Mr. Holstrom was a project engineer and project manager during design and construction of the Central Valley Water Reclamation Facility (1981-1992) while with the DMJM/Brown and Caldwell joint venture. He received his bachelor's degree in watershed sciences from Colorado State University (1975) and a master's in engineering from Utah State University (1979). He was President of the Water Environment Association of Utah (1997) and a recipient of the WEF Arthur Sidney Bedell Award (1997). He is also a recipient of the "Contributor to the State of Excellence" award from the Governor's Office of Oklahoma (1987)

C. Dasch Houdeshel is a Ph.D candidate and iUTAH graduate research fellow in the Civil and Environmental Engineering Department at the University of Utah. He graduated from Oregon State University with a B.S. in arid land ecology and has worked as an ecosystem sciences research technician in arid systems in Oregon, California, and southern Utah. Dasch first became interested in water resources engineering while river guiding on the Colorado River through Utah and the Grand Canyon. This exposure led him to change fields and completed a M.S. at the University of Utah in water resources engineering. He is now combining his previous arid land ecosystems background with his technical water resources engineering degree to improve the sustainability of water resources management in our semi-arid climate. Specifically, Dasch's studies look to engineer ecosystems to maximize on-site stormwater retention that reduces nutrient loading to receiving waters, replicates pre-development hydrology in urban settings, and is implemented as a no-irrigation landscaping alternative. While studying at the University of Utah, Dasch has worked on a wide variety of water resources projects. The focus of his master's degree was to develop a cost tool for the EPA that estimates costs of low impact development. Dasch has also worked with the City of Moab to analyze their culinary water distribution system and help plan for future growth. In addition to his research, Dasch has also worked with the University of Utah's Office of Sustainability to implement and monitor four bioretention gardens on campus that are actively treating stormwater from impervious surfaces. Currently, Dasch is collaborating with the Stable Isotope Ratio Facility for Ecological Research (SIRFER) to trace stable isotopes of nitrogen through test bioretention gardens to better understand the biological mechanisms of how these facilities respond to the nitrogen loading we predict will occur in our environment.

Patrick Leary has spent his professional career working in local government administering large organizations such as the Office of the District Attorney, the Salt Lake County Clerk's Office. He served for 4 years as the associate director for the Administrative Services Department of Salt Lake County. In 2011 he was appointed by the Salt Lake County mayor as the director of the Public Works Department responsible for 7 agencies with almost 400 employees and a combined budget of \$93 million. This department provides city services to the unincorporated residents in the Salt Lake valley, as well as regional services countywide. Mr. Leary has conducted numerous organizational studies, teaches courses in management and is a skilled facilitator. Mr. Leary is completing a master's degree in public administration from the University of Utah, and completed his undergraduate work at Utah State University.

Garland Mayne is currently employed by the South Valley Sewer District (SVSD) for the facility manager position at the new Jordan Basin Water Reclamation Facility located in Riverton, Utah. He has filled that position for 4 ½ years serving as the SVSD representative during construction. Garland's previous employment was with Timpanogos Special Service District as the district manager for 30 years. Garland is a past president of the Utah Water Environment Association (1982-1983) and a past president of Utah Rural Water Association. He has a Grade IV Wastewater Operator certification and a Grade IV Collection System certification, and served on the Voluntary Certification Board for 18 years and the Mandatory Certification Board for 3 years. Mr. Mayne was an adjunct faculty member at Utah Valley State College and specializes in the environmental degree program, instructing biological processes, wastewater mathematics, hydraulics, pumps and pumping, and disinfection. Garland is a member of the National Environmental Training Association and in 1983 participated in a Technology Transfer at different cities within the People's Republic of China. Garland has been a member of the Water Environmental Association of Utah for over 38 years and has been involved in the wastewater field for 40 years. Garland is married to Kristy. They have 7 children and 21 grandchildren and 2 great grandchildren. His hobbies include camping, fishing, hunting, horses, rock hounding and other outdoor sports.

Eric McCulley is a senior associate ecologist with ENVIRON International Corporation. He is currently serving as the chair of Utah Linking Communities, Wetlands and Migratory Birds, which is an organization with a mission to advance conservation, education and ecotourism in the United States, Mexico, and Canada. He also serves on the Jordan River Commission Technical Advisory Committee and the newly formed Salt Lake City Parks, Natural Areas, Trails, and Urban Forestry Board. He has a degree in geology from James Madison University and is working on a master's in watershed science at Utah State University.

Jon Nepstad is a principal and project manager in the Salt Lake office of Fehr & Peers, a western states firm dedicated to providing the best transportation planning and traffic engineering services to a variety of clients and communities. Jon has been involved in transportation planning projects in the Wasatch Mountains, from Park City to the Cottonwoods, for over a dozen years. He is currently the project manager on the Mountain Transportation Study. Jon has a Master of Planning from the University of Kansas. When not working in the Wasatch, Jon tries to get out and enjoy the mountains as much as he can.

Karen Nichols, with HDR Engineering in Salt Lake City, has more than 25 years of experience working with public and private clients providing environmental compliance, permitting, mitigation, and audits. She specializes in Clean Water Act (CWA) compliance for surface water quality, wetlands, stormwater quality, permitting and monitoring, and watershed analyses projects. She has worked on watershed planning with Salt Lake County during the development of the Water Quality Stewardship Plan, looking at watershed issues related to land use management, wastewater collection and facility planning, and water quality.

Russell E. Norvell is a wildlife biologist at the Non-game Avian Program at the Utah Division of Wildlife Resources (UDWR). His focus is on conceptualizing, designing, funding, and managing research projects studying non-game birds in western North America, in particular bird populations in riparian and shrub-steppe habitats. In partnership with Patrick Nelson from Salt Lake Public Utilities, Russell E. Norvell started the Volunteer Citizen project at City Creek Canyon since 2010 to monitor the avian community. This partnership has now three partners: UDWR, Public Utilities, and Tracy Aviary.

Jenni Oman has worked for Salt Lake County Engineering and Flood Control for five years as an engineer. Her BS and MS degrees are from the University of Utah, in civil engineering emphasizing water resources. She has worked on multiple successful river and creek restoration projects throughout the valley, as well as various flood control projects. She has enjoyed her time working at the County, especially since she always has an excuse to go be next to a body of water (provided it is a nice weather day).

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 urban water infrastructure, green infrastructure, stormwater best management practices, watershed management and permitting and compliance. 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 was co-chair of the Water Environment Federation task force to update the Manual of Practice No. 23 Design of Urban Runoff Controls, which was published in 2012. She is a registered professional engineer in Michigan.

Andrea Pullos grew up in the Salt Lake area. She attended the University of Utah, graduating in 1986 with a degree in mining engineering. She started her career as a mining engineer in Beatty Nevada. One day she saw a sign on the door of a bar that said NO Minors allowed and knew then that the life of a miner wasn't for her and that a career change was needed. She started work with Salt Lake County in 1991 first as an engineering technician, moving to a design engineer and finally becoming the County's transportation engineer. During this time she earned a master's degree in civil engineering with an emphasis in transportation engineering. As the Salt Lake County transportation engineer she oversees highway design, manages the safer sidewalk and traffic calming programs, conducts

transportation studies, and works with the community councils, the bicycle community, UDOT and others interested in transportation issues. She also oversees the Development Engineering Review Section. Andrea is the County's project manager for the Canyon Parking Study, the Mountain Transportation Study, and the Mill Creek Alternate Transportation Study.

Lee Rawlings received his undergraduate degree from the University of Utah in biology with an emphasis in biochemistry. He earned a Master of Public Administration from Brigham Young University in 2009. Over the course of his career, Lee has worked approximately 23 years in the water/wastewater field. He started working at South Valley WRF in December 1998 as laboratory director. In June 2011 he transferred over to the Facility Operations Department taking the position of department director. Recently Lee was asked to take over when the general manager retires in January 2013. Lee is also the laboratory director of Water & Environmental Testing, Inc., an aquatic toxicology laboratory based in American Fork.

Carolina Roa is originally from Colombia. While working with Russell Norvell at the Utah Division of Wildlife resources, since 2011, she has been leading the Volunteer Citizen project at City Creek Canyon, now based at Tracy Aviary where she currently works. Her areas of interests involve public participation in biological sciences and bird-oriented research.

Hal Robins is an economist by trade, a long-time civil servant with professional ties to the University of Utah and family ties to the early rural communities of Scipio and Lehi Utah. His guiding principles include being a good steward for our planet, contributing to a better local community, and cooperating with others for the common good. Citizen science projects like the Volunteer Citizen project at City Creek Canyon have allowed him to help work toward his life goals.

Kathleen Robins is a native of Utah with roots in the northern part of the state going back several generations. Many in her family have been farmers and made their living on the land. She is a graduate of the University of Utah and worked in the public sector in education for 35 years. Her love of nature and caring for the environment have led her to be an avid gardener and outdoors woman including being a long-time birder. She has been a volunteer for several citizen science projects the latest being the Volunteer Citizen project at City Creek Canyon.

Court Strong is an assistant professor in the Department of Atmospheric Sciences at the University of Utah. He teaches courses in advanced statistical methods and also the physics of climate. His research focuses on variations in climate with particular interest in how the atmosphere and climate change affect seasonal snowpack and sea ice. He is the recipient of the 2008 James R. Holton Award from the American Geophysical Union. Strong holds the American Meteorological Society Seal of Approval for Broadcast Meteorology. Prior to enrolling in graduate school, he spent seven years as a broadcast meteorologist at television network affiliates in Texas, California, and Kentucky.

Nicholas von Stackelberg is an environmental engineer with the Utah Department of Environmental Quality. Nicholas has worked on water resources and water quality projects for twenty years with several consulting firms and governmental agencies in Seattle and Salt Lake City. In his current position with the Division of Water Quality, he is responsible for water quality modeling to support discharge limit determination and standards development, as well as antidegradation policy administration. He received his Bachelor of Science in Civil Engineering from the University of Washington and Masters of Science in Biological and Agricultural Engineering from North Carolina State University. Nicholas is a registered Professional Engineer in Washington and Utah.

Tom Ward is deputy director of Salt Lake City's Department of Public Utilities. He is a professional engineer with over 20 years' experience specializing in water quality and environmental engineering, planning, design and management of drinking water, storm water and wastewater systems throughout Utah, Idaho, Nevada and Washington. Tom has designed, constructed and managed treatment plants, constructed wetlands, flood control, riparian corridor habitat and recreation enhancement facilities, as well as wastewater reuse and land application systems. His current role includes supporting the City's Water Reclamation Division whose 56 million gallon per day wastewater reclamation facility discharges directly to the Great Salt Lake, as well as the City's Water Quality & Treatment Division which manages the City's drinking water quality, riparian corridors and storm water quality permitted discharge to the Jordan River.

Tyler White has extensive experience in commercial and residential site development and design. Areas of expertise include hydrology, hydraulics, open channel flow, and road & site design. He has master planned the urban hydrology and secondary systems for Daybreak, a 4,700 acre master planned community in South Jordan, Utah. He has followed the modeling experience with committing the model information to infrastructure design, producing over 40 miles of storm conveyance piping and routing design as well as pressurized water system infrastructure design of pipe and various utility vaults. Tyler has also worked on site development projects performing site grading, drainage reports, designing curb, gutter and sidewalk, and parking areas. Other areas of expertise include present value analyses and project management. Tyler has a B.S. in Civil Engineering and a B.A. in Finance from the University of Utah.

Notes

