

Tackling the Impossible



2018 Annual Conference
September 25-28, 2018
The Westin Snowmass Resort
Snowmass Village, CO

WELCOME TO THE 29TH ANNUAL CASFM CONFERENCE!

The CASFM Board and Conference Committee have spent the past year planning informative activities for conference attendees, while also including time to socialize with old friends and to, hopefully, make new acquaintances in a beautiful mountain setting. It is our hope that everyone who attends the annual conference in Snowmass gets to experience fantastic speakers, outstanding workshops, informative presentations, and time in the mountains.

Our theme this year - "Tackling the Impossible" - was inspired by Teju Ravilochan, co-founder of Uncharted (formerly Unreasonable Institute). Uncharted takes on specific social and environmental problems, builds armies of people best positioned to solve those problems, and equips those people with what they need — mentors, funders, and partners — to attack those problems from all sides. Building on our keynote theme, the other featured speakers, technical track presenters, and project award nominees are representative of Colorado's outstanding leaders in the stormwater and floodplain management community. The conference program reflects the current state of the stormwater and floodplain management community in Colorado by highlighting innovation in projects and programs located throughout the state.

The Board and Conference Committee would like to thank the numerous presenters, sponsors, volunteers, and attendees that make the conference a success. We rely on you to provide guidance and leadership for CASFM and the annual conference.


Sarah Houghland
Conference Chair
Enginuity Engineering Solutions




Deb Ohlinger
CASFM Chair
Olsson Associates

2018 CASFM CONFERENCE COMMITTEE



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Media
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Lilly Murphy
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Jen Winters
Mtn Bike Tour
RESPEC



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#CASFM2018**

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ABOUT THE 2018 CONFERENCE

KEYNOTE SPEAKER - TEJU RAVILOCHAN



Teju Ravilochan is co-founder of Uncharted (formerly Unreasonable Institute). Uncharted takes on specific social and environmental problems, builds armies of people best positioned to solve those problems, and equips those people with what they need — mentors, funders, and partners — to attack those problems from all sides. To date, Uncharted has powered 61 programs in 24 countries supporting 592 startups. The first 171 startups have collectively raised \$220 million and benefited 25 million people. Recent initiatives include the Future Cities Accelerator (funded by The Rockefeller Foundation), an effort to serve the needs of poor or vulnerable populations via 10 of the country's best startups and Uncharted Food Access (funded by the City and County of Denver), which united Denver's best startups tackling food deserts in the city. Teju left his position as CEO of Uncharted after working there for 9 years in December 2017 to explore new ways to create large scale systems change. He remains on the board.

Teju is also a Forbes 30 Under 30 Entrepreneur, an Inc. Magazine 30 Under 30 Entrepreneur, and a TEDx speaker. Teju graduated from the University of Colorado at Boulder in 2008 with a degree in international affairs. He lives in Denver, Colorado and enjoys puns, time with friends and family, reading, and being outdoors.

THURSDAY FEATURED SPEAKER - JOSH DUNCAN



Josh Duncan, P.E. is a husband, father, humanitarian, advocate for the marginalized and vulnerable, outdoor enthusiast, engineer, and professional photographer. After graduating from Colorado State University with a B.S. and M.S. in Civil Engineering, Josh began his career as a successful water resource engineer and oversaw water development projects throughout Colorado and the mid-west. His passion for clean water, mountains, and serving ultimately led him to Nepal in the fall of 2011 with MountainChild, a non-profit organization that exists for the purpose of raising awareness, resources, and financial aid for humanitarian projects carried out among the impoverished children of the Himalayas. This journey took Josh into remote villages only accessible by foot and strenuous trekking over arduous terrain where he directly encountered lives impacted by extreme poverty, lack of clean water, no opportunities for education, and the tragedy of human trafficking. This crisis of encounter turned his world upside right and from that moment, his life shifted into the passionate service of carrying hope to the children of the Himalayas with MountainChild. Josh began serving with MountainChild in 2012 as a full-time volunteer and their Director of Development where he managed, administered, and designed life-giving infrastructure in the remote villages of Nepal. In 2015, he took over the responsibility of MountainChild's US National Director of Operations where he now oversees development, operations, partner cultivation, mobilization, strategy, and advocating for the precious children of the Himalayas. Josh is a Colorado native and lives in Parker with his beautiful wife Courtney and their two children, Caleb (4) and Abigail Grace (2). Courtney and Josh are also expecting their third child, another son, this October.



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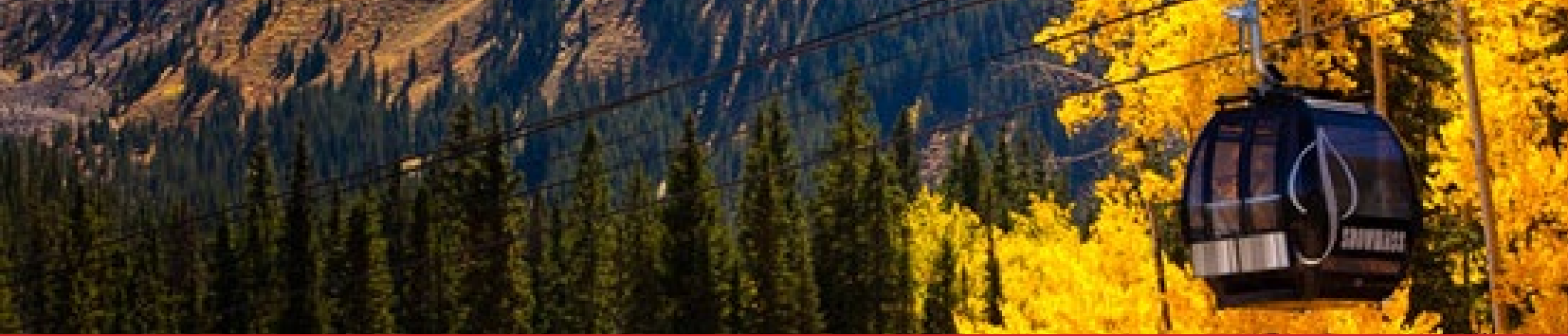
THANK YOU TO OUR 2018 CASFM CONFERENCE VOLUNTEERS!

2018 CASFM Conference Volunteers		
Name	Company	Role
Sarah Houghland	Enginuity	Chair, Abstract Review Team
Julia Traylor	Wright Water Engineers	Programs, Abstract Review Team
Stuart Gardner	CDOT	Facilities
Amy Gabor	Olsson Associates	Vendors
Kevin Doyle	Michael Baker International	Moderator Coordinator
Stacey Thompson	SEMSWA	Guidebook Administrator, Advisory Panel
Jeffrey Cheng	St. Cloud State University	Workshops
Thuy Patton	CWCB	Karaoke
John Loranger	Amec Foster Wheeler	Golf Tournament
Colin Wagoner	Calibre Systems	Awards, Project Award Review Team
Jennifer Winters	RESPEC	Mountain Bike Tour
Susan Pearson	Town of Silverthorne	Yoga
Emily Villines	Calibre Engineering (Calibre)	Media & Graphic Design, Committee Liaison - Outreach & Training, Abstract Review Team
Lilly Murphy	Calibre Engineering (Calibre)	Media & Graphic Design
Alan Turner	Jacobs	Registration Coordinator
Molly Trujillo	SEMSWA	Photography Coordinator
Frans Lambrechtsen	Jacobs	Photography, Moderator
Paul Anderson	CDM Smith	Photography
Robert Krehbiel	Matrix Design Group	Advisory Panel, Abstract Review Team
Shea Thomas	UDFCD	Advisory Panel, Abstract Review Team
Deb Ohlinger	Olsson	Advisory Panel, Abstract Review Team
Morgan Lynch	UDFCD	Advisory Panel, Abstract Review Team, Moderator
Marsha Hilmes Robinson	City of Fort Collins	Committee Liaison - CRS
Christopher Hodyl	J3 Engineering	Committee Liaison - Floodplain Management
Brian Varrella	CDOT	Committee Liaison - FTAP, Moderator
Jim Wulliman	Muller Engineering Company	Committee Liaison - Stormwater Quality, Abstract Review Team
Jacob James	Town of Parker	Committee Liaison - Scholarship
Jeremy Deischer	ICON Engineering	Committee Liaison - Young Members Group
Brent Kaslon	Valerian	Moderator, Abstract Review Team
Michelle Ibings	Tetra Tech	Moderator
Terry Rogers	City of Lakewood	Project Awards Review Team
Alan Searcy	City of Lakewood	Project Awards Review Team
John Pfau	JMP Water Engineering	Project Awards Review Team
Pat Dougherty	retired City of Arvada	Project Awards Review Team
Dan Hill	RESPEC	Moderator

THANK YOU TO STUART GARDNER!

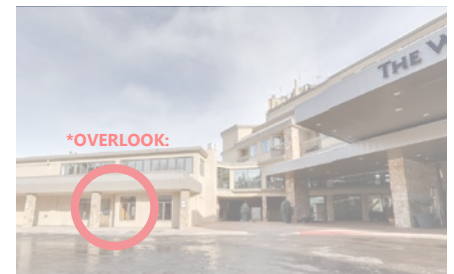
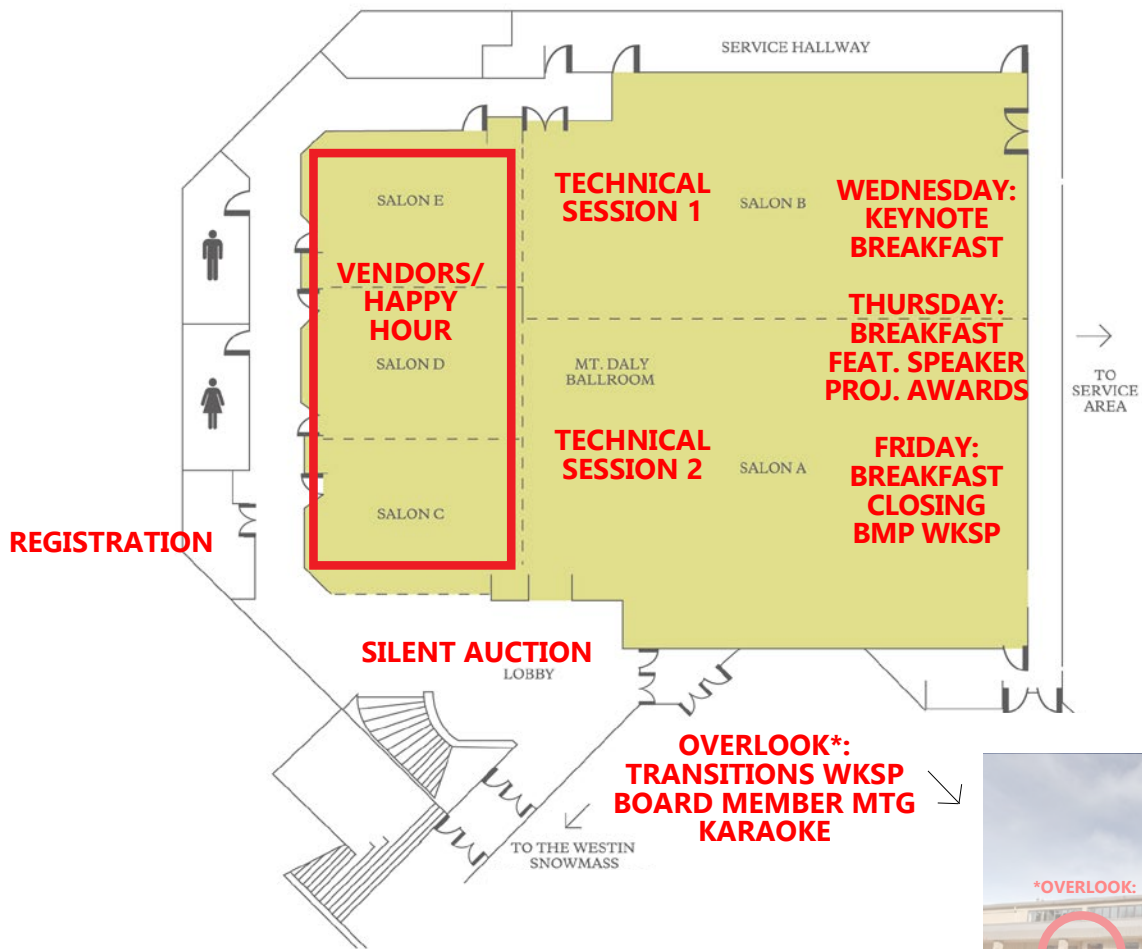
There are few CASFM members that can remember a conference where Stuart Gardner was not prominently involved in planning the event or entertaining us during the awards banquet. We ignored Stuart's pleas to hand over facilities coordination, entertainment duties, and website management for a long time, but it is only fair to let him sleep in and enjoy the conference the way so many others have over the years. The Conference Committee and the CASFM membership would like to extend our appreciation to Stuart for his efforts to make the conference a success for all of these years and for his other contributions to CASFM. Stuart will continue to help out with conference planning and to support CASFM, and we are fortunate that he has not completely retired from the group! Thanks again, Stuart!





FACILITY MAPS

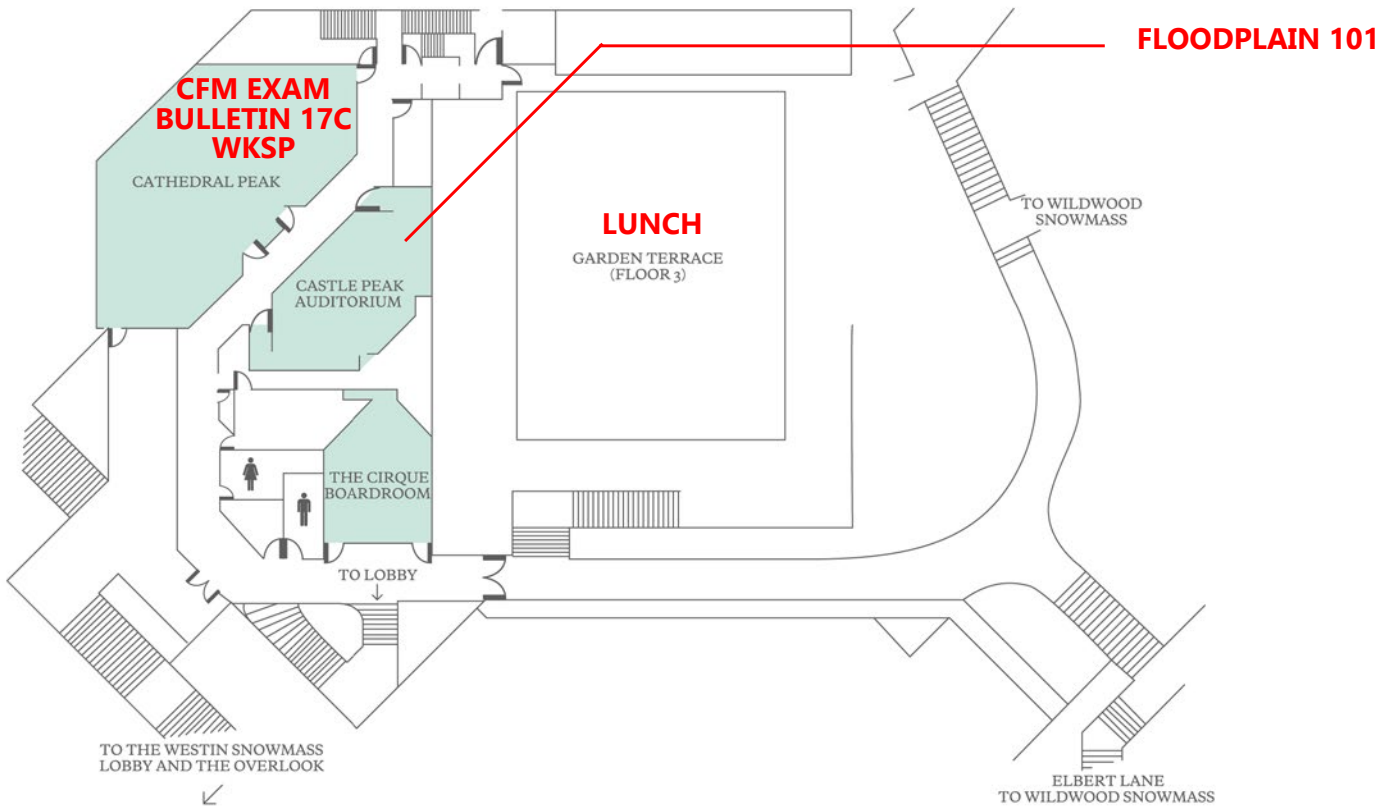
FLOOR 1





FACILITY MAPS CONTINUED

FLOORS 2 & 3



FIELD TRIPS

John Denver Sanctuary

Led by April Long, City of Aspen

The John Denver Sanctuary is nestled in the heart of Aspen, next to the Rio Grande Park. The manmade wetlands and winding streams work as an innovative storm water filter system, cleaning water before it drains into the Roaring Fork River. The City of Aspen transformed this small ditch, which used to flow through an underground pipe, into an environmental masterpiece. They sculpted thousands of cubic yards of earth, found and placed hundreds of boulders, planted groves of native trees, shrubs, and wildflowers, and created wetlands, streams, and waterfalls into this unique landscape, which captures Aspen's beauty and serves to continuously clean the community's storm water runoff.



Guided Hike to Maroon Lake

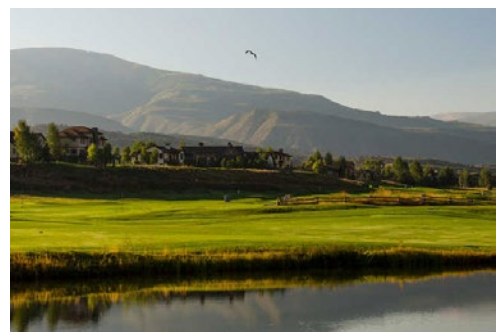
Led by Aspen Center for Environmental Studies

Join us for a guided hike to Maroon Lake with the Aspen Center for Environmental Studies (ACES). This hike should be absolutely stunning in the fall! Participants will take the bus from Snowmass to Highlands and then start the hike from the trailhead at the East Maroon Portal. The roughly 3 mile hike at a moderate grade should take about 2.5-3 hours. The ACES naturalist will share information about geology, aspen trees, wildflowers, and wildlife. Participants will take a bus back to Snowmass from Maroon Lake.



GOLF TOURNAMENT

This year's golf tournament will be held at Gypsum Creek Golf Course, 530 Cotton Ranch Drive, Gypsum, CO 81637. Please be aware that the Gypsum Golf Course is a 90 minute drive from Snowmass. **The tournament will have a Shotgun Start at 9:30, so you should arrive at the course no later than 9:00.** The golf course is a Pete Dye designed 18 hole Championship course for players of all caliber. Spread out over a steep, sage-covered mesa, this challenging course beguiles golfers with splendid natural scenery and a bit of deception. The signature fifteenth hole is a daunting par-5 that exceeds 550 yards from the back tees and is almost never reached in two shots thanks to the prevailing winds. From there on, steep drop offs and tough angles are the status quo for this truly spectacular course.



Who: Any conference attendee who registers
Where: Gypsum Creek Golf Course, 530 Cotton Ranch Drive, Gypsum, CO 81637
When: Friday, September 28, 2018; 9:30 shotgun start
Cost: \$55 per player | \$220 per team
Format: 4-person scramble
Lead By: John Loranger, Wood PLC

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MOUNTAIN BIKE RIDE

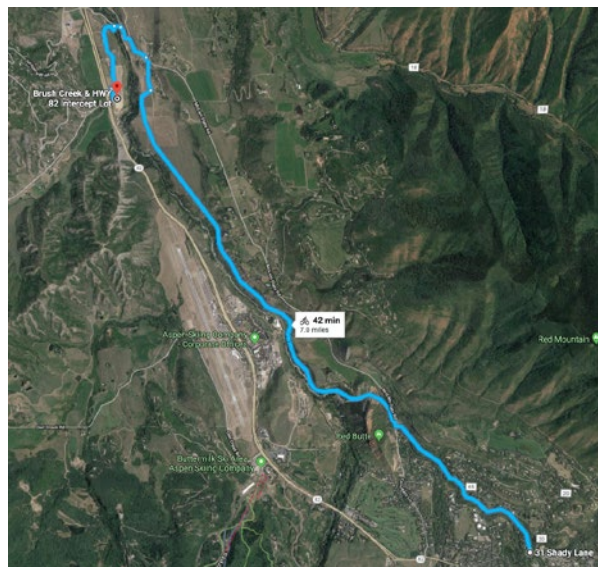
Mountain Bike Tour - Rio Grande River Trail

Led by: Jen Winters, RESPEC

Join us on a morning bike tour through Aspen to learn more about improvements on and near to the Roaring Fork River. We will start our tour at the Brush Creek and HWY 82 Intercept Lot and follow the Rio Grande River Trail into the Town of Aspen. Along the way, we will stop to look at key points of interest. Local project representatives will be on hand to describe the challenges and successes for each project.

This round trip ride will consist of a total of 14 miles with approximately 200ft of elevation gain. Bikers of all abilities are welcome to join. Please be sure to bring water, sun protection, and a small snack with you – we will be out from 9am to noon.

Bike rental information will be available shortly. Please email Jennifer Winters at RESPEC (jennifer.winters@respec.com) if you plan on renting a bike for the tour.



SILENT AUCTION

Proceeds from the Silent Auction fund our CASFM Scholarships.

Since 2002, CASFM has awarded more than \$70,000 to students in Colorado. If you are interested in donating, please contact Jacob James, Town of Parker, at 303-805-3166 or jjames@parkeronline.org.

2017-2018 CASFM Scholarship Awards:

Ben Urbonas Scholarship: Ross Mower

The 2017-2018 CASFM Ben Urbonas Scholarship recipient is Ross Mower, a graduate student at the Colorado School of Mines. Ross is interested in green infrastructure techniques to help promote sustainable water resources. He is working to develop his knowledge of hydrology and hydrogeology. Currently, Ross is working with the City of Denver Public Works/Wastewater Division (with Darren Mollendor) and ReNUWIt (with Professors John McCray and Chris Higgins) on developing Best Management Practices and Low Impact Development Systems for treating contaminated stormwater.

Family Scholarship: Casey Bangs

The 2017-2018 CASFM Family Scholarship award recipient is Casey Bangs, son of Kimberly Watkins at the Pikes Peak Regional Building Department. Casey is attending the University of Colorado at Boulder and is on track to earn a bachelor of science in environmental engineering. He realized the importance of protecting public health and safety from hearing about the Waldo Canyon fire, Black Forest fire, and Gold King Mine spill. These events have inspired him to pursue a career in environmental engineering and clean water in particular.

Undergraduate Scholarship: Alex McPherson

The 2017-2018 CASFM Undergraduate Scholarship recipient is Alex McPherson, a student at the University of Colorado at Denver. Alex was an educator, but made the change to civil engineering after experiencing the impacts of the September 2013 floods. Observing the different flood mitigation projects along the front range inspired Alex to return to school in order to help Coloradans with similar projects in the future. Alex would like to be a voice in the community for smart development to avoid human and structural losses in future floods unlike the events of 2013.

2018 GRANT RECIPIENT

Earth Force is grateful for CASFM's support of our Rocky Mountain Environmental Challenge (RMEC) in partnership with FEMA Region VII. We are working with Colorado schools to decrease communities' flood risk through student-led action projects. The inaugural RMEC summit took place in Fort Collins on May 10, 2018, and included students from Fort Collins and Estes Park. Work is currently underway to implement the flooding prevention projects the students proposed. We are also busy recruiting and training educators in Thompson School District, Poudre School District, and St. Vrain Valley School District, so we expect a significant increase in participation at the 2019 RMEC!



TUESDAY SEPT. 25, 2018

8:00AM TO 5:00PM Floodplain 101

Matthew Buddie - FEMA Region VIII, Stephanie DiBettito - CWCB, Kevin Houck - CWCB, James Kaiser - City of Thornton, Chris Hodyl - J3 Engineering

Location: Castle Peak Auditorium

The Floodplain 101 workshop will cover overall floodplain management, floodplain maps and Flood Insurance Studies, key National Flood Insurance Program (NFIP) regulatory and non-regulatory standards, flood insurance, and flood hazard mitigation, among other topics. If you need a refresher, this is a course you don't want to miss

2:00PM TO 5:00PM Workshop: Bulletin 17C Analyses on Regulated Streams – A Case Study of the Colorado and Arkansas River Basins

Brad Bettag - Wood Environment and Infrastructure Solutions, Kevin Houck - Colorado Water Conservation Board

Location: Cathedral Peak

This workshop will present the challenges of applying Bulletin 17C procedures to the highly regulated Colorado and Arkansas River basins and provide insight to the techniques used, as well as lead the attendee through lessons learned and example Bulletin 17C analyses. Please come with your own laptop. Data will be provided via flash drive.

2:00PM TO 5:00PM Workshop: Transitions - Fostering Community in Times of Change

Penn Gildersleeve - retired ICON Engineering, Jeremy Deischer - ICON Engineering, Shea Thomas - UDFCD, Alan Turner - Jacobs, Cassie Kaslon - Valerian, Troy Carmann - ICON Engineering, Deborah Fisher - Water Engineering Solutions

<https://www.casfm.org/wp-content/uploads/2018/08/CASFM-Transition-Flyer.pdf>

Location: The Overlook

Just starting out or old timer? Large or small employer? Public or Private? No matter what the answer, we all strive for a successful career. This workshop will help foster a community of understanding, cooperation, sharing, and encouragement....even when transitions occur.

5:00PM TO 8:00 PM Dinner on Your Own

8:00PM TO 9:00PM Ice Breaker Social Hour

Sponsored By: Triton Environmental

Location: Vendor Area



10:00AM TO 10:15AM CASFM Chair Welcome Address

Deb Ohlinger - Olsson Associates

Location: Salon A & B

10:15AM TO 11:30AM Keynote Address - Tackling the Impossible

Tejasvi (Teju) Revilochan - Uncharted

Location: Salon A & B

11:30AM TO 1:00PM General Membership Meeting and Lunch

Location: Garden Terrace

1:00PM TO 1:30PM Break

1:30PM TO 3:00PM Technical Sessions (see Wednesday Technical Sessions for details)

3:00PM TO 3:30PM Break

3:30PM TO 5:00PM Technical Sessions (see Wednesday Technical Sessions for details)

5:00PM TO 6:30PM Happy Hour

Sponsored by: RESPEC

Location: Vendor Area

AFTER 6:30PM Dinner on Your Own



WEDNESDAY TECHNICAL SESSIONS TECHNICAL MODELING

Location: Cathedral Peak

Moderator: Michelle Ibings - Tetra Tech

REGULATING 2D MODELS & TOOLS FOR PLANNING 1:30PM

Isaac Allen - AECOM; Thuy Patton - Colorado Water Conservation Board (CWCB)
Regulatory guidance is focused on 1D models. As recent advancements have led to the more frequent use of 2D modeling, questions have arisen. This presentation will focus on products from 2D models and how 2D models will be regulated.

HOW TO BE LESS WRONG – ERRORS AND UNCERTAINTY IN HYDRAULIC MODELING 2:00PM

Ryan Carroll; Daniel Aragon - Michael Baker International

Hydraulic modeling is prone to uncertainty. This presentation will highlight our research on the sources and magnitude of uncertainty in hydraulic models, and will discuss how to reduce and effectively communicate this uncertainty to stakeholders.

TOOLS TO STAY AHEAD OF THE STORM 2:30PM

Dana McGlone - Dewberry; Kevin Houck - CWCB; Kevin Stewart - UDFCD

Heavy rainfall events in Colorado put people and property at risk. Numerous scientific and computing advances in recent years have paved the way for atmospheric models to produce more reliable quantitative precipitation forecasts (QPF). Learn the basics of QPF forecasting and rainfall climatology, as well as objective and subjective forecasting tools.

WEDNESDAY SEPT. 26, 2018

7:00AM TO 8:00AM Yoga

Susan Pearson - Town of Silverthorne

Location: The Overlook

7:00AM TO 10:00AM Certified Floodplain Manager Exam

Location: Cathedral Peak

8:00AM TO 10:00AM Registration

Location: Floor 1 Registration

8:00AM TO 10:00AM Breakfast

Meet our Scholarship and Stormwater Quality Committees.

Location: Salon A & B



BENDWAY WEIRS AND 2D MODELING: AN INNOVATIVE STREAM DESIGN

3:30PM

Aaron Sutherlin, Drake Ludwig - Matrix Design Group, Inc.

To restore a laterally unstable reach along Fountain Creek, Matrix Design Group paired reference reach information with detailed two-dimensional hydraulic modeling to design bendway weir structures that improve bank stability and creek function, reduce sediment loading, and protect adjacent property.

QUANTIFYING CLIMATE CHANGE IMPACTS ON FLOOD HYDROLOGY USING GLOBAL CLIMATE MODELS TO ADJUST NOAA ATLAS 14 PRECIPITATION DEPTHS

4:00PM

Derek Rapp, Jim Wulliman - Muller Engineering Company; Brian Varrella - CDOT
Climate change impacts on flood hydrology are rarely evaluated due to the disconnect between large-scale global models and localized models. This presentation discusses tools that can evaluate impacts of climate change on NOAA Atlas 14 precipitation frequency estimates.

EVOLUTION OF 2-D BASE LEVEL ENGINEERING ACROSS FEMA REGION VIII AND A CASE STUDY FROM GARFIELD COUNTY, COLORADO

4:30PM

Eli K. Gruber, Garrett Sprouse - CDM Smith; David Sutley - CWCBC
A look at the evolution of 2-D BLE modeling for projects throughout FEMA Region VIII, focusing on technical aspects of modeling and mapping. A case study from Garfield County, Colorado highlights innovative modeling techniques to overcome technical challenges.

WATERSHED PLANNING

Location: Salon A

Moderator: Frans Lambrechtsen - Jacobs

WELCOME TO THE RIVER MILE

1:30PM

Gregory Murphy - Calibre Engineering; Christopher Kroeger - Muller Engineering; Mike Galuzzi - Merrick

The River Mile will change the face of Denver, from record-topping skyscrapers to connecting with the South Platte in new and meaningful ways; and from establishing a Downtown Energy District to improving stormwater quality along the river corridor. Introducing The River Mile to Colorado's stormwater community, this presentation will focus on stormwater quality and quantity, improvement to the South Platte River, and overall infrastructure master planning.

PLANNING FOR RECREATION AND RESILIENCE ON THE BIG THOMPSON RIVER

2:00PM

Chris Carlson & Kevin Gingery - City of Loveland; Andrew Earles - Wright Water Engineers; Brandon Parsons - THK Associates

We will explore planning and siting issues for various types of constructed whitewater features and venues. The goal is to provide engineers, stakeholders, and planners with an ability to identify whitewater recreation opportunities in their communities.

WATERSHED FRAMEWORK TO MANAGE RUNOFF AND CREATE LOW MAINTENANCE STREAMS – STROH TRIBUTARY CASE STUDY

2:30PM

Andrew Earles - Wright Water Engineers; Jim Wulliman - Muller Engineering; Barbara Chongtouna - UDFCD

The objective of this project is to improve our understanding of the planning and development process from the watershed planning level to the site design level with the goal of better integrating water quality, drainage and flood control in a way that preserves, enhances or mimics natural processes.

FLOODPLAIN MANAGEMENT

Location: Salon A

Moderator: Frans Lambrechtsen - Jacobs

LOCAL CHOICES AND HOW THEY CAN IMPACT THE NFIP

3:30PM

Traci Sears - Montana DNRC

Elected officials are making daily decisions that could impact local communities and vulnerable flood area. Learn about actions that may assist in reducing the impact of the choices that can undermine the fundamental principles of the NFIP.

HYPER HYDROLOGY: A HOLISTIC VIEW OF COLORADO HYDROLOGY THROUGH THE COLORADO HAZARD MAPPING PROGRAM

4:00PM

Chris Ide, Josh Hill - Wood Environment and Infrastructure Solutions; Thuy Patton - Colorado Water Conservation Board

With diverse terrain comes diverse hydrology. This presentation details the methods used and the challenges that occurred while conducting hydrologic studies in Colorado, from the eastern plains to the western mountains, as part of the Colorado Hazard Mapping Program (CHAMP).

MAKING THE MOST OF IT: LEVERAGING THE CHAMP STUDY FOR OTHER USES

4:30PM

Erin Cooper, Olivia Cecil - Boulder County; Kevin Doyle - Michael Baker International
CHAMP has armed Boulder County with a wealth of high quality flood risk data. Boulder County has been leveraging the data to provide useful flood risk products to residents, and other County staff beyond the standard Flood Insurance Rate Maps.

WATER MEDLEY

Location: Salon B

Moderator: Brent Kaslon - Valerian

OH NO! WE'VE GOT TO GO UNDER IT!

1:30PM

Becky Brock - Brierley Associates; Chris Knott - BTrenchless

Tunneling can be an essential component for conveying flow when your storm drain alignment crosses beneath a railroad or highway. An engineer and contractor will discuss project considerations along with methods and materials that are well suited for stormwater tunnels.

PLANNING AND SITING OF RECREATIONAL WHITEWATER FEATURES

2:00PM

Brooke Seymour - UDFCD; Richard McLaughlin - Merrick & Company

We will explore planning and siting issues for various types of constructed whitewater features and venues. The goal is to provide engineers, stakeholders, and planners with an ability to identify whitewater recreation opportunities in their communities.

NATURE PLAY DESIGN GUIDELINES – TECHNIQUES FOR INCLUDING NATURE PLAY WITHIN FLOODPLAINS

2:30PM

Cassie Kaslon - Valerian LLC; Frans Lambrechtsen - CH2M/Jacobs; Adam Bienenstock - Bienenstock Natural Playgrounds

In September, 2017 Design Guidelines for Nature Play in the Built Environment were released. In this 30-minute presentation we will review the Floodplain Interface section of the guidelines to discuss specific techniques for integrating nature play into a floodplain.

PROFESSIONAL DEVELOPMENT

Location: Salon B

Moderator: Brent Kaslon - Valerian

THE TRUTH ABOUT MOTIVATION & TEAM-BUILDING 3:30PM

Emily Villines, MA, CPSM - Calibre Engineering

This presentation will introduce the concepts behind what really motivates us, helping you learn how to motivate not just yourself but your peers, your team, your supervisors, and your colleagues.

WONDERLAND CREEK LESSONS LEARNED 4:00PM

Robert Glenn, Kurt Bauer - City of Boulder

The City of Boulder is completing construction of a 21-million-dollar flood and greenway improvement project. This project will provide 100-year channel improvements for one mile of creek. This presentation will highlight the lessons learned from design, funding, and construction.

ASK THE FLOOD CONTROL DISTRICT 4:30PM

Shea Thomas, Laura Kroeger, Dave Bennetts - UDFCD

We are hosting a session where the subject is UDFCD, but the focus is you. Join us to discuss whatever has been on your mind relating to UDFCD and play a role in growing our learning community together.

7:00PM TO 9:30PM

CASFM Dinner & Awards Ceremony

Location: Salon A & B

Sponsored by: Stream Landscape Architecture & Planning

stream
landscape architecture + planning

9:30PM TO 11:30PM

Karaoke | **Location: The Overlook**

Sponsored By: Muller Engineering

MULLER
ENGINEERING COMPANY

Trivia | **Location: Salon A & B**

Sponsored By: CORVUS Environmental


CORVUS

THURSDAY TECHNICAL SESSIONS DETAILS

EMERGENCY PREPARATION

Location: Cathedral Peak

Moderator: Brian Varrella - CDOT

EXTREME RAINFALL EVENTS ALONG THE FRONT RANGE OF COLORADO: HOW MUCH DID WE FIND AND HOW MUCH DID WE MISS?

1:30PM

Baxter Vieux - Vieux & Associates, Inc; Kevin Stewart - UDFCD

Advancement in rainfall monitoring tech. is helping to better identify flood-producing rainfall. Radar and rain gauge technology improves flash flood prediction and our understanding of where and when extreme rainfall patterns have occurred, especially between the gauges.

STRUCTURE-LEVEL RISK ASSESSMENT USING 2D PROBABILISTIC MODELING

2:00PM

Geoff Uhlemann - AECOM

Monte Carlo sampling can be used to develop flood inundation probabilities and structure-based risk assessments informing insurance rates, mitigation efforts, and emergency preparedness. This process accounts for uncertainty by creating hundreds to thousands of 2D hydraulic models with differing assumptions.

MAPPING FLUVIAL HAZARD ZONES: DEVELOPING QUANTITATIVE GUIDANCE, APPLICATION, AND PILOT MAPPING PROGRAM

2:30PM

Stephanie DiBettito - Colorado Water Conservation Board; Joel Sholtes - Bureau of Reclamation; Katie Jagt - Watershed Science and Design

Colorado has recently developed a fluvial hazard zone (FHZ) mapping pilot program. This presentation will introduce the programmatic aspects of the FHZ program including how it came to be, and discuss the mapping procedures and technical results of the studies.

EVACUATION PLANNING FOR EXTREME EVENTS: FAILURE OF THE CHERRY CREEK DAM

3:30PM

Jeffrey Brislawn, Kyle Karsjen - Wood Environment and Infrastructure Solutions

We will cover the considerations and challenges in planning for catastrophic flooding in a densely populated urban environment involving multiple jurisdictions and range of flooding scenarios, from controlled release (non-failure) to complete failure of the dam.

FLOOD RISK RELATED TO DAMS

4:00PM

Kallie Bauer, Bill McCormick - Colorado DNR - Dam Safety

The potential for flood hazards from dam releases or spillway flows exists. Colorado Dam Safety has developed a tool for ranking dams in Colorado by risk factors that could lead to downstream flooding.

SHOWCASING BOULDER COUNTY'S FLOOD RISK INFO. SYSTEM (FRIS): HOLISTIC FLOOD RISK COMMUNICATION

4:30PM

Madeline Kelley, Thuy Patton - Colorado Water Conservation Board

This program is a continuation of what was presented last year. A live product is now available to present and discuss the overall process and resulting platform's capabilities and limitations.

THURSDAY SEPT. 27, 2018

7:00AM TO 8:00AM

Yoga

Susan Pearson - Town of Silverthorne

Location: The Overlook

8:00AM TO 9:00AM

Breakfast

Location: Salon A & B

Sponsored By: Bohannon Huston

Meet our Outreach & Training and Floodplain Management Committees.

Bohannon  **Huston**

9:00AM TO 10:00AM

Featured Speaker | Josh Duncan, MountainChild

Introduced By: Deb Ohlinger - Olsson Associates

Location: Salon A & B

10:00AM TO 11:30AM

2018 Award Finalists

Moderated by: Colin Wagoner - Calibre Systems

Location: Salon A & B

11:30AM TO 1:00PM

Lunch

Location: Garden Terrace

11:30AM TO 1:00PM

Board Meeting

Location: The Overlook

1:00PM TO 1:30PM

Break

1:30PM TO 5:00PM

Technical Sessions (See Thursday Technical Sessions below for details)

5:00PM TO 6:30PM

Happy Hour

Location: Vendor Area

Sponsored By: ERO Resources

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CASFM 

GREEN INFRASTRUCTURE & LID

Location: Salon A

Moderator: Dan Hill - RESPEC

QUANTIFYING VOLUME REDUCTION IN GRASS SWALES AND GRASS BUFFERS

1:30PM

Holly Piza - UDFCD; Andrew Earles - Wright Water Engineers

The new Phase II MS4 permit includes a design standard for runoff reduction. Developing a tool for implementation involved literature review, field tests, and detailed SWMM analysis. New criteria along with an Excel-based tool are the product of this work.

NAVIGATING THE NEW JERSEY AND WASHINGTON STATE STORMWATER PROGRAMS AS MODELS FOR APPROVING MANUFACTURED TREATMENT DEVICES

2:00PM

Mark Miller - AquaShield, Inc.

This presentation identifies fundamental and subtle aspects of the New Jersey and Washington State stormwater programs to use as models for local approvals of proprietary manufactured treatment devices based on performance evaluations of laboratory and field testing protocols.

STACKING THE BENEFITS OF LID AND PERMACULTURE

2:30PM

Patrick Padden - Padden Permaculture, Basil Hamdan - City of Fort Collins

Low Impact Development (LID) infrastructure can address the challenges of cleaning stormwater and mitigating flood risk. It also offers the opportunity to fully utilize rainwater to create a ripple of positive benefits. This presentation will address how the implementation of rainwater collection systems at the local scale can be used in providing permaculture that will enable the use of an essential water resource such as rainwater in creating agricultural ecosystems that are sustainable and self-sufficient.

STORMWATER QUALITY/TREATMENT

Location: Salon A

Moderator: Dan Hill - RESPEC

COMPREHENSIVE WATERSHED PLANNING TO PRIORITIZE, TARGET, AND IMPLEMENT MULTI-PURPOSE PROJECTS

3:30PM

Shawn Tracy - HR Green, Inc.

Minnesota's One Watershed, One Plan provides a case study as Colorado moves toward implementation of the State's planning efforts and promotes discussion for how existing and future watershed plans may be integrated to prioritize, target, and implement multipurpose projects.

DEVELOPING A COMPREHENSIVE STORMWATER INFRASTRUCTURE MASTER PLAN TO MEET MULTIPLE OBJECTIVES

4:00PM

Drew Beck - Matrix Design Group

The City of Colorado Springs Stormwater Infrastructure Master Plan (SIMP) collects, standardizes, and integrates information on stormwater capital and O&M projects needed to address current and future stormwater and drainage conditions in the City.

STRATEGIC PLANNING FOR GREEN INFRASTRUCTURE IN BOULDER

4:30PM

Candice Owen - City of Boulder

The City of Boulder is embarking on a strategic planning process to understand how to best implement stormwater green infrastructure. The plan focuses on two primary areas with internal city stakeholder engagement: process and policy and prioritized pilot projects.

STREAM RESTORATION

Location: Salon B

Moderator: Morgan Lynch - UDFCD

WHEN ENGINEERS GO WILD!

1:30PM

Rich Borchardt, Barbara Chongtouna - UDFCD

Have you walked next to your favorite creek and been inspired? Rich and Barb walked along Cherry Creek exploring it. After seeing it, they've been inspired to Go Wild to make a healthier and happier stream.

URBAN STREAM DESIGN - HOW WE GOT TO NOW

2:00PM

Dave Skuodas - UDFCD; Mary Powell - Corvus Environmental Consulting

A look at the evolution of urban stream design through the lens of five continuous miles of a single stream that has been configured differently each ½ mile or so, giving each reach its own "vintage".

THE SAGA OF CONFLUENCE PARK | SHOEMAKER PLAZA

2:30PM

Jamie Davis, ECI Site Construction Management, Nicole Horst, Wenk LA

Construction of Shoemaker Plaza began in March 2015. However, just two months in, coal tar was discovered in the soil and the water, which presented a critical issue to be resolved. Overcoming these conditions necessitated value-added processes not customarily delivered under a bid-build format.

GUNNISON RIVER AND RIPARIAN HABITAT RESTORATION PROJECT

3:30PM

Steve Westbay - City of Gunnison; Dan Brauch - Colorado Division of Parks and Wildlife

This presentation addresses a river/riparian restoration program located in the Gunnison River State Wildlife Area. The Colorado Division of Parks and Wildlife and City of Gunnison partnered in the restoration project on a 1.5 mile river reach. Collaboration was the key element for successfully implementing this unique restoration project.

DRONE BASED RIPRAP IMAGING AND GRADATION MEASUREMENT

4:00PM

LeAndra Nelson, George Cotton, Ben Constable - Kiewit Infrastructure Engineers

This presentation shares KIE's experience in the use of drone acquired images to comprehensively determine riprap rock gradation in a river corridor. A case study is presented for the US34 permanent flood repair project in Big Thompson Canyon, Colorado.

ACTION & REACTION: APPROACHES FOR UNDERSTANDING SEDIMENTATION & EROSION

4:30PM

Matthew Johnson, Brinton Swift - HDR

Before escalating to a sediment transport model, there are simplified approaches to apply to understand changes on the riverine environment. This presentation focuses on some simplified approaches and highlights drawbacks, limitations, and solutions for each.

FRIDAY SEPT. 28, 2018

7:00AM TO 8:00AM

Yoga

Susan Pearson - Town of Silverthorne

Location: The Overlook

7:30AM TO 8:30AM

Breakfast

Location: Salon A & B

8:30AM TO 9:00AM

CASFM Chair Closing Remarks & Announcements

Deb Ohlinger - Olsson Associates

Location: Salon A & B

9:00AM TO 12:00PM

Workshop: Inspection & Maintenance of Post-Construction BMPs

Tyler Dell - Colorado Stormwater Center

Location: Salon A & B

All stormwater post-construction BMPs require regular maintenance to operate as designed. This workshop provides attendees with information regarding the activities and frequency of activities for performing post-construction BMP inspection and maintenance.

9:00AM TO 12:00PM

Field Trips

MOUNTAIN BIKE TOUR (9-12) | Led by Jennifer Winters - RESPEC

Meeting Location: Brush Creek and Hwy 82 Intercept Lot

JOHN DENVER SANCTUARY (9-12) | Led by April Long - City of Aspen

Meeting Location: Instructions will be emailed to everyone registered for the field trip.

GUIDED HIKE TO MAROON LAKE (9-12) | Led by Aspen Center for Environmental Studies

Meeting Location: Instructions will be emailed to everyone registered for the field trip.

**9:30AM TO 1PM
(OR UNTIL FINISHED)**

Golf Tournament:

Location: Gypsum Creek Golf Course

Sponsored By: Contech Engineered Solutions



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Brent Kaslon - Valerian

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Dan Hill - RESPEC

Morgan Lynch - UDFCD

TECHNICAL SESSIONS AT A GLANCE

WEDNESDAY

	Technical Modeling	Watershed Planning	Floodplain Management	Water Medley	Professional Development
	Location: Cathedral Peak <i>Moderator: Michelle Ibings, Tetra Tech</i>	Location: Salon A <i>Moderator: Frans Lambrechtsen, Jacobs</i>	Location: Salon A <i>Moderator: Frans Lambrechtsen, Jacobs</i>	Location: Salon B <i>Moderator: Brent Kaslon, Valerian</i>	Location: Salon B <i>Moderator: Brent Kaslon, Valerian</i>
1:30PM	Regulating 2D Models & Tools for Planning <i>Isaac Allen & Thuy Patton</i>	Welcome to the River Mile <i>Greg Murphy, Christopher Kroeger, & Mike Galuzzi</i>	-	Oh No! We've Got to Go Under It! <i>Becky Brock & Chris Knott</i>	-
2:00PM	How to Be Less Wrong – Errors and Uncertainty in Hydraulic Modeling <i>Ryan Carroll & Daniel Aragon</i>	Planning for Recreation and Resilience on the Big Thompson River <i>Chris Carlson, Kevin Gingery, Andrew Earles, & Brandon Parsons</i>	-	Planning and Siting of Recreational Whitewater Features <i>Brooke Seymour & Richard McLaughlin</i>	-
2:30PM	Tools to Stay Ahead of the Storm <i>Dana McGlone, Kevin Houck, & Kevin Stewart</i>	Watershed Framework to Manage Runoff and Create Low Maintenance Streams –Stroh Tributary Case Study <i>Andrew Earles, Jim Wulliman, & Barbara Chongtous</i>	-	Nature Play Design Guidelines – Techniques for Including Nature Play within Floodplains <i>Cassie Kaslon, Frans Lambrechtsen, & Adam Bienenstock</i>	-
3:30PM	Bendway Weirs and 2D Modeling: An Innovative Stream Design <i>Aaron Sutherlin & Drake Ludwig</i>	-	Local Choices and How They Can Impact the NFIP <i>Traci Sears</i>	-	The Truth About Motivation and Team Building <i>Emily Villines</i>
4:00PM	Quantifying Climate Change Impacts on Flood Hydrology using Global Climate Models to adjust NOAA Atlas 14 Precipitation Depths <i>Derek Rapp, Jim Wulliman, & Brian Varrella</i>	-	Hyper Hydrology: A Holistic View of Colorado Hydrology Through the Colorado Hazard Mapping Program <i>Chris Ide, Thuy Patton, & Josh Hill</i>	-	Wonderland Creek Lessons Learned <i>Robert Glenn & Kurt Bauer</i>
4:30PM	Evolution of 2-D Base Level Engineering Across FEMA Region VIII and a Case Study from Garfield County, Colorado <i>Eli Gruber, Garrett Sprouse, & David Sutley</i>	-	Making the Most of It: Leveraging the CHAMP Study for Other Uses <i>Erin Cooper, Kevin Doyle, & Olivia Cecil</i>	-	Ask the Flood Control District <i>Shea Thomas, Laura Kroeger, & Dave Bennetts</i>

TECHNICAL SESSIONS AT A GLANCE

THURSDAY

	Emergency Preparation	Green Infrastructure & LID	Stormwater Quality & Treatment	Stream Restoration
	Location: Cathedral Peak <i>Moderator: Brian Varrella, CDOT</i>	Location: Salon A <i>Moderator: Dan Hill, RESPEC</i>	Location: Salon A <i>Moderator: Dan Hill, RESPEC</i>	Location: Salon B <i>Moderator: Morgan Lynch, UDFCD</i>
1:30PM	Extreme Rainfall Events Along the Front Range of Colorado: How Much Did We Find and How Much Did We Miss? <i>Baxter Vieux & Kevin Stewart</i>	Quantifying Volume Reduction in Grass Swales and Grass Buffers <i>Holly Piza & Andrew Earles</i>	-	When Engineers Go Wild! <i>Rich Borchardt & Barb Chongtouna</i>
2:00PM	Structure-Level Risk Assessment Using 2D Probabilistic Modeling <i>Geoff Uhlemann</i>	Navigating the New Jersey and Washington State Stormwater Programs as Models for Approving Manufactured Treatment Devices <i>Mark Miller</i>	-	Urban Stream Design - How We Got to Now <i>Dave Skuodas & Mary Powell</i>
2:30PM	Mapping Fluvial Hazard Zones: Developing Quantitative Guidance, Application, and Pilot Mapping Program <i>Stephanie DiBettito, Joel Sholtes, & Katie Jagt</i>	Stacking the Benefits of LID and Permaculture <i>Patrick Padden & Basil Hamdan</i>	-	The Saga of Confluence Park Shoemaker Plaza <i>Jamie Davis & Nicole Horst</i>
3:30PM	Evacuation Planning for Extreme Events: Failure of the Cherry Creek Dam <i>Jeffrey Brislawn & Kyle Karsjen</i>	-	Comprehensive Watershed Planning to Prioritize, Target, and Implement Multi-Purpose Projects <i>Shawn Tracy</i>	Gunnison River and Riparian Habitat Restoration Project <i>Steve Westbay & Dan Brauch</i>
4:00PM	Flood Risk Related to Dams <i>Kallie Bauer & Bill McCormick</i>	-	Developing a Comprehensive Stormwater Infrastructure Master Plan to Meet Multiple Objectives <i>Drew Beck</i>	Drone Based Riprap Imaging and Gradation Measurement <i>LeAndra Nelson, George Cotton, & Ben Constable</i>
4:30PM	Showcasing Boulder County's Flood Risk Information System (FRIS) - A Pilot Project for Holistic Flood Risk Communication <i>Madeline Kelley & Thuy Patton</i>	-	Strategic Planning for Green Infrastructure in Boulder <i>Candice Owen</i>	Action & Reaction: Approaches for Understanding Sedimentation & Erosion <i>Matthew Johnson & Brinton Swift</i>

CASFM ENGINEERING EXCELLENCE PROJECT AWARD

The CASFM Engineering Excellence winners and nominees highlight some of the most innovative projects completed in Colorado since 1992. CASFM is honored to be able to provide project stakeholders an opportunity to showcase projects that enhance the public health, safety, and welfare by offering incorporate creative, unique, or innovative solutions that include multiple-objective management to achieve project goals.

Abstracts for the three award finalists are included in this program. Please join us for the award presentations on Thursday, September 27 at 10:00 AM in Salon A & B and vote for your favorite project. The results will be revealed at the Awards Banquet Thursday night. A description of the 2017 award winning project and immediate past winning projects are included below.

2017 CASFM AWARD: LITTLE DRY CREEK CORRIDOR WESTMINSTER, CO

Thank you for voting to award our Little Dry Creek Drainage and Flood Control project the 2017 Engineering Excellence Award! Our project team is very proud to have been selected for this honor. The Little Dry Creek Drainage project encompassed nearly 40-acres that was filled with trash, groundwater contamination, deteriorating wet utilities, rundown industrial buildings, a creek that chronically overtopped its incised banks, and two dozen structures in the floodplain. Original cost estimates approached \$25M to fix these problems and transform the space to make it engaging and accessible. With the finished project costing just over \$16M, the community now enjoys a transformed area hosting a new lake, nearly 5 miles of trails, double the number of trees and, an accessible creek edge designed to be inviting and explored. The Little Dry Creek Drainage project was a significant component to a greater \$80M investment in this once blighted neighborhood, most notably, RTD's new "B" Line Commuter Rail Station and an emerging transit oriented development.



Previous CASFM Award Recipients (Previous 10 Years)		
Year	Winning Project	Companies & Agencies
2017	Little Dry Creek Park	City of Westminster, UDFCD, Adams County, State of Colorado, Muller, and Matrix
2016	South Platte River Vision Implementation Program: Grant- Frontier Park to Overland Pond Park	The Greenway Foundation, City and County of Denver Parks and Recreation Department, CDM Smith
2015	Cherry Creek Balley Ecological Park	Arapahoe County Open Space, SEMSWA, UDFCD, Cherry Creek Basin Water Quality Authority, Muller Engineering Company, Valerian
2014	To Move a River- Saving Loveland's Water Supply	City of Loveland, Ayres Associates, and Tetra Tech
2013	Lefthand Creek Flood Control Project	City of Longmont, Muller, Went, ERO, Naranjo
2012	Canal Importation Pond and Outfall Design	City of Fort Collins, Ayres Associates, and Anderson Consulting Engineers
2011	Pine Creek Stream Stabilization, Bridge and Storm Sewer Project	SEMSWA, UDFCD, Arapahoe County, Centennial, and Ayres Associates
2010	Elmer's Two-mile Greenways Project	City of Boulder, Urban Drainage, WH Pacific, and Centennial Engineering
2009	South Platte River Globeville and North Areas Flood Control and Greenways Project	City and County of Denver, UDFCD, and Belt Collins West
2008	Montclair Storm Drainage Improvements	City and County of Denver, UDFCD, and WHPacific, Inc

2018 CASFM AWARD NOMINEES

Woodbriar Park Renovation, Greeley, CO



Repeated stormwater flooding of the residential neighborhood prompted the City of Greeley to seek options for better stormwater management. The Woodbriar Park Renovation Project improved an existing 7-acre neighborhood community park to include flood control storage while enhancing a highly-valued community open space. An extensive public engagement process identified community preferences for the park improvements while also educating park users on the stormwater management objectives. Unique aspects of this project included a community engagement process that created excitement for the project; a multi-functional detention facility and separate natural creek channel; integration of environmental art with the natural creek channel; and site-sensitive nature play recreation. The \$2.5M multi-city agency project included:

- Multi-use, peak-shaving detention facility
- Natural creek channel daylit from previously piped flow
- Nature playground utilizing on-site park materials
- Interactive creek “diversion plaza” including a Parshall flume, slide gate, diversion runnels, and artwork
- Sustainable landscape conversion to reduce irrigation consumption and increase biodiversity within the park



Water & Sand Play Area



Salvaged Tree Climbers



Diversion Plaza



Diversion Runnels & Interpretive Artwork



Fall 2017



Summer 2018

2018 CASFM AWARD NOMINEES CONTINUED

Viestenz-Smith Mountain Park River Restoration

City of Loveland

The September 2013 flood caused devastating damage to the City of Loveland's historic Viestenz-Smith Mountain Park. Restoring the park and a resilient design was the City's primary objective which required an approach that "Let the River Be the Guide."

The Viestenz-Smith Mountain Park opened in 1925, one year after construction of the historic Loveland Light and Power plant.

In 1926, the site was expanded to include 400 acres and was opened to the public for picnics and hiking. In 1976 the Big Thompson River experienced a dramatic flood with an estimated peak flow of 30,500 cubic feet per second. The dam failed, the pipeline was destroyed, and the hydroelectric plant was severely damaged. The flood damaged or destroyed most of the park features, and the river avulsed with a channel located south of the pre-flood alignment. After the flood, both the dam and power plant were reconstructed with the intent of being more resilient to floods, and the channel was relocated back to the northern pre-flood alignment. The plant was reopened in 1978 and the park was restored at the same time to be a developed park with manicured lawns and landscaping.

During the 2013 flood, the river again avulsed toward the south. The flood destroyed the bridge, parking lot, sidewalks, irrigation pond, pump, playground and all the picnic and memorial plantings and benches. The historic Civilian Conservation Corps structure was destroyed, along with landscaping, trails, and associated infrastructure. After the flood, CDOT contractors again placed the river channel back to its northern pre-flood location. The City also completed other emergency repairs along with debris removal in the winter of 2014.

The 2013 flood caused devastating damage to the Park and scoured away most major park elements on the south side of the Big Thompson River's pre-flood alignment. The City received FEMA Flood Recovery Grant funding for the project. The re-design included a southerly channel alignment that was consistent with the post-avulsion planform that occurred after the 1976 and 2013 floods, and an expansion of recreational opportunities on the north overbank. As a general philosophy, the approach was to improve the resiliency of the park by adding several channel stabilization measures, while still considering natural aesthetics and river ecology. The re-design is a more natural setting that better blends into the character of the canyon and its environment.

Construction of the channel and floodplain stabilization features were performed primarily with on-site remnant flood material. To the extent possible, bio-engineered measures were used except where project constraints and extreme hydraulic conditions required more resilient treatments.

Use of on-site material and coordination with CDOT to obtain excess material from highway reconstruction operations also resulted in significant cost savings. As a result, the project was expanded to include an upper parking lot, an additional pedestrian bridge, and extension of river restoration efforts throughout the Park extents.

River stabilization and park features include:

- Boulder Drop Structures
- Floodplain Benches and Lateral Boulder Trains
- Pool-Riffle Habitat
- Stacked Boulder Wall
- Accessible Fishing Platform
- Bio-engineered Stream Banks with Boulder Toe Material
- Parking Lot with Reinforced Subgrade
- Bridge Abutments with Micropiles to Bedrock
- Engineered Streambed Material



2018 CASFM AWARD NOMINEES CONTINUED

Colorado

Emergency Watershed Protection

In early September 2013 several days of rain caused massive flooding across Colorado's Front Range communities. Streams reclaimed floodplains, destroyed roads, bridges, and buildings and ripped vegetation from riverbanks. In total, the flood caused approximately \$4 billion in damage to infrastructure and public and private property. Emergency repairs opened highway corridors but often bulldozed rivers, leaving them in dysfunctional alignments and often with channels that were too small to safely convey normal river flows. Unable to self-repair, the damaged and unstable rivers needed a boost.

Communities came together with encouragement and support from Federal and State partners. Recognizing the impacts of historic encroachment on floodplains and seeing a need to build resiliency into the systems, the State took a new, more holistic approach to recovery. In the past, disaster recovery was often completed on an individual property within a single local jurisdiction. With this new approach, the State remained committed to protecting life and property, but implemented projects on a much larger scale. The State sponsored programs focused on five key principles:

1. Complete recovery work on a watershed scale with coordinated project design and sequencing
2. Support early planning to identify root issues, develop holistic solutions, and allow time to secure appropriate funding
3. Support watershed coalitions as a model for stakeholder engagement, improved project outcomes, and recovery that crosses jurisdictional boundaries to prioritize river system recovery
4. Execute projects with multiple objectives, including safety, ecological and environmental benefits, and community and economic development outcomes
5. Incorporate resiliency into every project to mitigate a similar scale of damage in future events

Thanks to early and bold visioning and partnership building by the Colorado Water Conservation Board (CWCB) and continued dedication to recovery principles by other State agencies like the Department of Local Affairs (DOLA), Division of Local Government, as well as numerous local and private partners, the recovery of Colorado's flood impacted watersheds have created a new model for disaster recovery.

RIGHT: Before and after photos of the Emergency Watershed Protection project on the North Fork of the Big Thompson River.

EWP

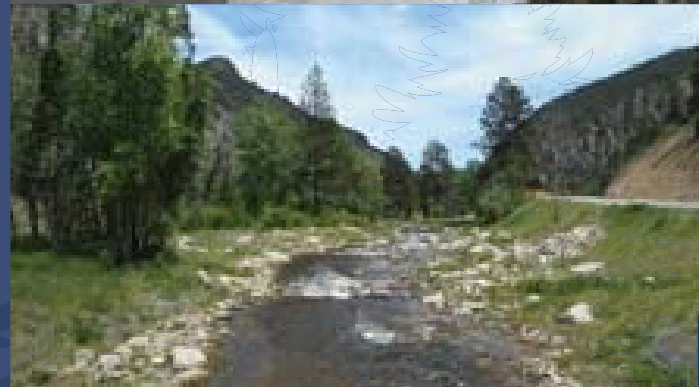
By the Numbers

- Timeline: March 2015 - May 2018
- **68** total flood recovery projects completed
- Total construction costs of nearly **\$50 million**
- Over **\$270 million** in avoided short-term damage to infrastructure and private structures
- **40 miles** of river and floodplain improvements implemented
- Over **700** private property owners engaged
- 18 different local project sponsors including watershed coalitions and local governments.
- Program coordinated the growing of native plants through the Colorado State Forest Service to fully meet the supply demands of all 67 EWP projects.

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POST PROJECT



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- Wildlife Studies
- Functional Assessments
- Revegetation and Restoration
- Noxious Weed Management
- Threatened and Endangered Species Surveys
- Endangered Species Act Compliance
- NEPA and Environmental Compliance
- Cultural and Historical Resources

Creative solutions to environmental issues

WE KNOW STORMWATER.

- ▲ WATERSHED MASTER PLANNING
- ▲ HYDROLOGY & HYDRAULICS
- ▲ STORMWATER INFRASTRUCTURE & BEST MANAGEMENT PRACTICES

Bohannon  **Huston**

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Services

- Stream Design
- Stormwater Management
- Water and Wastewater Utilities
- Traffic/Transportation Design
- Structural/Bridge Design
- Program Management

*Proudly serving Colorado
for over 35 years!*



CORVUS

Environmental Consulting LLC

High-Level Thinking
Down-to-Earth Approach



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Environmental Compliance



Restoration Ecology

Why Choose CORVUS?

- Creative and effective strategies
- Deep involvement from planning to construction
- Practical approach acceptable to regulators
- Reduce risks with team and regulator collaboration

Expertise In:

- Clean Water Act Section 404
- Wetland and riparian mitigation and restoration
- Endangered Species Act
- Threatened and endangered species surveys
- National Environmental Policy Act
- Migratory Bird Treaty Act
- GIS analysis and mapping

DBE WBE SBE

NOTES

Complete Schedule at-a-Glance

TUESDAY, SEPTEMBER 25, 2018		
8:00	Floodplain 101	
9:00		
10:00		
11:00		
12:00		
1:00		
2:00		Bulletin 17C Training
3:00		Transitions: Fostering Community During Change
4:00		
5:00		
6:00	Dinner on Your Own	
7:00		
8:00-9:00	Ice Breaker Social Hour Sponsored by Triton	

WEDNESDAY, SEPTEMBER 26, 2018			
7:00	Yoga		Certified Floodplain Manager (CFM) Exam
8:00	Registration and Breakfast		
9:00			
10:00	CASFM Chair Welcome		
	Keynote Address - "Tackling the Impossible" by Teju Revilochan		
11:00			
	Lunch General Membership Meeting		
12:00			
1:00	Break		
	Technical Modeling	Watershed Planning	Water Medley
2:00			
3:00	Break		
	Technical Modeling	Floodplain Management	Professional Development
4:00			
	Happy Hour Sponsored by RESPEC		
5:00			
6:00			
	Dinner on Your Own		

THURSDAY, SEPTEMBER 27, 2018			
7:00	Yoga		
8:00	Breakfast Sponsored by Bohannon Huston		
9:00	Featured Speaker: Josh Duncan, MountainChild		
10:00	2017 Project Award Finalist Presentations		
11:00			
12:00	Lunch Board Member Meeting		
1:00	Break		
2:00	Emergency Preparation	Green Infrastructure & LID	Stream Restoration
3:00	Break		
4:00	Emergency Preparation	Stormwater Quality	Stream Restoration
5:00	Happy Hour Sponsored by ERO		
6:00			
	Break		
7:00-9:30	CASFM Association Dinner and Awards Sponsored by Stream		
9:30-11:30	Trivia (Sponsored by Corvus) & Karaoke (Sponsored by Muller)		

FRIDAY, SEPTEMBER 28, 2018					
7:00	Yoga		Breakfast		
8:00					
	Closing Remarks				
9:00	Workshop: Inspection & Maintenance of Post-Construction BMPs	Mountain Bike Tour	John Denver Sanctuary	Guided Hike to Maroon Lake	Golf Tournament Sponsored by Contech
10:00					
11:00					
12:00					
1:00					
2:00					

Color Key

	Workshops & Sessions
	Social Events
	Meals & Food
	Break
	CFM Exam
	Field Trips & Tours

SEE YOU NEXT YEAR AT
THE 30TH ANNUAL
CASFM CONFERENCE!

#CASFM2019

September 24-27

CRESTED BUTTE MOUNTAIN RESORT

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