Welcome to the Urban Drainage and Flood Control District's

2016 Annual Seminar

2016 UDFCD ANNUAL SEMINAR PROGRAM

April 5, 2016 at the OMNI Hotel in Broomfield
500 Interlocken Blvd | Broomfield CO 80021

7:30 AM	8:15 AM	Registration and Continental Breakfast	
8:15 AM	8:20 AM	The Honorable Joyce Downing, Mayor of Northglenn and Chair of UDFCD Board of Directors	Welcome!
8:20 AM	9:10 AM	Paul Hindman, P.E., Scott Tucker, P.E. (UDFCD Retired), Ken Wright, P.E. (Wright Water)	Creating a Safer Community
9:10 AM	9:35 AM	Jane Clary, LEED AP, CPESC (Wright Water)	E. Coli Mitigation Toolbox
9:35 AM	9:55 AM	Morning Networking Break	
9:55 AM	10:35 AM	Kevin Stewart, P.E., Dmitry Smirnov, Ph.D. (Dewberry)	State of the Science (SOS)—Recognizing Flood Threats Hours Before the Rains Come
10:35 AM	11:15 AM	David Mallory, P.E., Jenelle Kreutzer (ERO Resources)	Community CRS Support Initiative and Recent Developments in the LOMC Process
11:15 AM	11:55 AM	Holly Piza, P.E.	Urban Storm Drainage Criteria Manual Volumes 1 and 2 Revisions—What's New?
11:55 AM	12:45 PM	Lunch Buffet, Speaker Kevin Rein, Colorado Division of Water Resources **Presentation of 2016 Friend of UDFCD Award**	
12:45 PM	1:25 PM	David Skuodas, P.E.	Connecting Vegetation Management to the Mapped Flood Risk
1:25 PM	2:10 PM	Joe Williams, Steve Materkowski, EIT, CPESC, Jason Stawski, EIT, Mike Sarmento	**Beyond Design: A Construction Manager's Perspective** - Soil Lifts Top Ten List - FEMA Flood Reimbursement, To Do or Not To Do - MEP Final Acceptance: Site Stability and Revegetation
2:10 PM	2:40 PM	Andrew Earles, P.E., Ph.D (Wright Water), Adam Kremers, P.E. (Wright Water)	Water Balance and Water Rights Analysis of the Effects of Full Spectrum Detention on the Colorado Front Range
2:40 PM	3:00 PM	Afternoon Networking Break	
3:00 PM	3:35 PM	Shea Thomas, P.E.	Adventures in Master Planning
3:35 PM	4:10 PM	Ken MacKenzie, P.E., Gerald Blackler, P.E., Ph.D (Enginuity)	Update on Regional Hydrologic Investigations
4:10 PM	4:15 PM	Paul Hindman, P.E.	Q & A, Closing remarks

The Urban Drainage and Flood Control District Creating a Safer Community

By Paul Hindman, UDFCD, Scott Tucker, UDFCD Retired, and Ken Wright, Wright Water Engineers

ABSTRACT:

In 1969 the Colorado State General Assembly created the Urban Drainage and Flood Control District (UDFCD). Early on several guiding principles were developed to lessen the destruction floods cause in the Denver Metro area. The discussion for our session will highlight many of those processes and policies which are integral to good floodplain management. The major items initiated were:

- *Maintenance Eligibility-Encourages local governments to develop within drainageways following District criteria.*
- *Floodplain Preservation-Partners with local governments to purchase flood prone properties*
- *Stream Stabilization-Prevents drainageways from aggrading or degrading so that property during a major flood is not severely damaged*
- *Masterplan to Maintenance-The full cycle of master planning a drainageway, designing improvements, construction, and then maintaining those improvements.*
- *Natural and Beneficial Uses of Floodplains-Incorporating all aspects of floodplains during design to maximize improvements not only financially but socially and environmentally.*
- *Flood Warning-A network of monitoring equipment used by engineering and meteorological professionals to alert first responders of a pending flood.*
- *Floodplain Regulation-Coordinating with local governments to responsibly develop in flood prone areas.*

None of the programs or processes mentioned above could, alone, protect the public from major damage during a flood, but combined the end result was a safer community for all of the citizens within the District boundaries. Our discussion will be presented by current and former founding fathers of UDFCD who made it all work.

SESSION 2

E. coli Mitigation Toolbox

By Jane Clary, Wright Water Engineers

ABSTRACT:

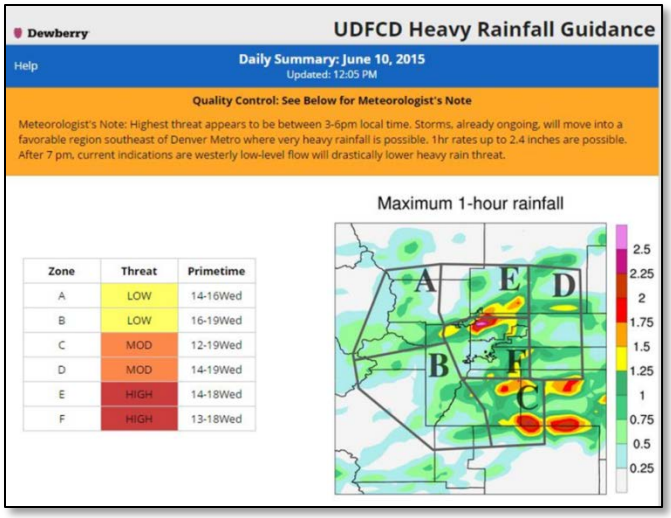
Approximately 70 stream segments in Colorado are currently identified as impaired or in need of additional monitoring and evaluation due to elevated E. coli concentrations relative to recreational water quality standards. For streams identified as impaired on Colorado's "303(d) List," typically the next step is development of a total maximum daily load (TMDL), which determines the load reductions needed to stream to attain recreational water quality standards. In urban areas, municipal separate storm sewer systems (MS4s) may have additional permit requirements to reduce E. coli loading as a result of these TMDLs.

UDFCD and the City and County of Denver along with Wright Water Engineering are developing a "toolbox" to provide a consolidated resource to support MS4s working to reduce E. coli loading to impaired waterbodies. Although the issue of E. coli impairment in urban areas is complex, this toolbox has been kept as simple as possible with the intention of providing readers with a broad range of backgrounds a resource to develop a general understanding of the issues and to provide tools that may be useful for reducing E. coli loads from urban areas.

State of the Science (SOS)—Recognizing Flood Threats Hours before the Rains Come

By Kevin Stewart, UDFCD, and Dima Smirnov, Ph.D., Dewberry

ABSTRACT:



High resolution gridded weather forecast models compete to answer the question…which one is best? Weather news reports frequently call attention to differences between European models and those built in the U.S. Canada offers some nice options too and meteorologists all seem to have their personal preferences. With so much invested in this research, UDFCD chose to take a closer look in 2015 by having meteorologists from Dewberry develop a website that leverages model outputs to advance the art of flash flood prediction. The website presents the collective results from 13 different quantitative precipitation forecast (QPF) models without favoring any particular model. Time series graphics are used to reveal agreement between the models. One-hour rainfall maximums are extracted from the models and presented geographically. Agreement between the models suggests the likelihood for flash flooding by addressing four crucial questions: 1) timing, 2) location, 3) intensity, and 4) confidence. The combined information presents a picture of where and when heavy rainfall is expected hours ahead of storm development and the impact-based threat levels corresponding to pre-defined forecast zones. Further analysis and refinement of this tool is anticipated for 2016.

This presentation will share what was learned from initial testing during the 2015 flood season, which delivered the highest number of heavy rainfall threat days in the past 37 years.

Community CRS Support Initiative and Recent Developments in the LOMC Process

By David Mallory, UDFCD and Jenelle Kreutzer, ERO Resources

ABSTRACT:

Community CRS Support Initiative

In the last year, UDFCD has taken a more active role in supporting our communities with their own Community Rating System (CRS) efforts. We have an updated UDFCD CRS Assessment Report that reviewed the District's activities and assessed how they currently support community CRS efforts. The new UDFCD CRS Support Committee will be reviewing the recommendations in the report and prioritizing potential projects from it in the upcoming year.

UDFCD also facilitated the formation of the multi-jurisdictional CRS Program for Public Information (PPI) committee that is just finishing up their first PPI plan for coordinated public outreach efforts. The multi-jurisdictional PPI is the first of its kind and required a tremendous coordination effort with the seven communities involved and the National Flood Insurance Program (NFIP) Insurance Specialist Officers that review the PPI for compliance with the guidelines.

Developments in the LOMC Process

FEMA has taken a revised stance on the process for ensuring Endangered Species Act (ESA) compliance with Conditional Letter of Map Change Requests (CLOMRs) over the past year. Documentation of Endangered Species Act Compliance for Conditional Letters of Map Change, was released in November 2015, and outlines the requirements and documentation necessary to meet this requirement depending on whether the proposed project has a federal nexus or is a completely private endeavor.

FEMA is requiring property owner notifications for both changes between effective and proposed conditions, as well as increases in the 1% annual chance (base) water-surface

elevations between existing or pre-project conditions and proposed conditions to be sent at the CLOMR stage. CLOMR notifications are being required for all changes to flood hazard data, no longer only when Section 65.12 is triggered.

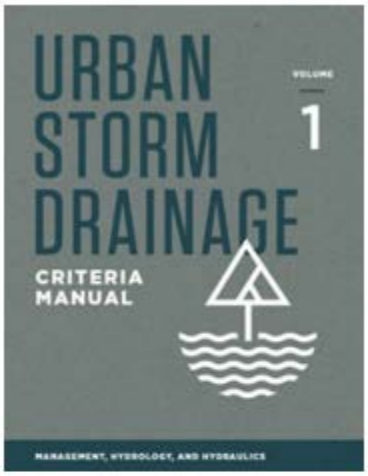
FEMA maintains guidelines and standards for the specific implementation of statutory and regulatory requirements for the NFIP in support of the Risk Mapping, Assessment and Planning (RiskMAP) program. Mandatory requirements are found in the Policy for Flood Risk Analysis and Mapping that was published in 2013. There is a maintenance plan in place to issue updates to the RiskMAP Guidelines and Standards on a semi-annual basis.

USDCM Volumes 1 and 2 Revisions – What's New?

By Holly Piza, UDFCD

ABSTRACT:

Over the last several years, UDFCD has been working on a major update of the Urban Storm Drainage Criteria Manual (USDCM) Volumes 1 and 2. UDFCD developed a group of stakeholders consisting of communities within the region, consultants, and other interested parties. Many provided input and review for the update. This presentation will include a summary of changes throughout the USDCM, which can now be freely downloaded as a PDF or purchased in 3-ring binders from UDFCD.



USDCM, Volume 1
Management, Hydrology and Hydraulics

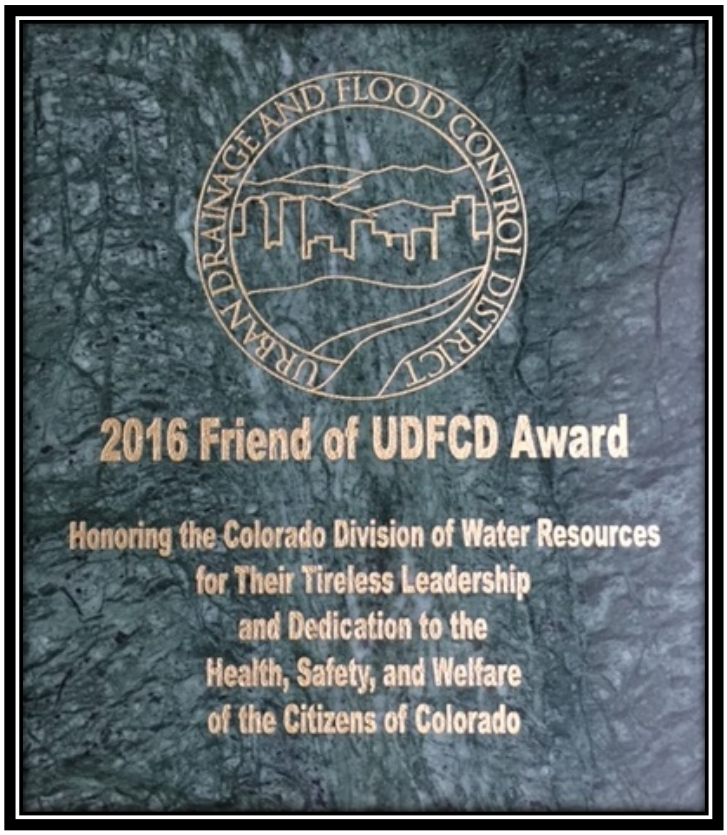
USDCM, Volume 2
Structures, Storage and Recreation

2016 FRIEND OF UDFCD AWARD

UDFCD has a long history of working closely with the Colorado Department of Natural Resources' **Division of Water Resources**. We have partnered on many flood mitigation dams that fall under their jurisdiction, dams that have reduced the flooding risk for thousands of Coloradans.

In 2014 and 2015, UDFCD worked with Kevin Rein, Dick Wolfe, and many others at the Division of Water Resources to enact new Colorado legislation that now protects municipalities and counties across Colorado in fulfilling their duty to provide responsible stormwater management. For their effort on this critical endeavor; and for their tireless leadership and dedication to the health, safety, and welfare of the Citizens of Colorado, we present to them the 2016 Friend of UDFCD Award.

Thank you, Colorado DWR!



When you Say "Rough", We Want to Know "How Rough?" Connecting Vegetation Management to the Mapped Flood Risk

By Dave Skuodas, UDFCD

ABSTRACT:

We map floodplains using a flood event based on specific rainfall intensity, volume, and duration, with static topography and fixed roughness values. In reality, flood discharges don't behave in a nice neat way, geomorphology and erosion lead to topography changes, and vegetation health and density can fluctuate wildly. Vegetation changes are easy to observe, can have a significant impact on roughness values, and are something we should be able to manage to reflect the mapped flood risk. There are frequent disconnects between planned roughness values and how vegetation actually develops in the channel, so how do we reconcile and manage these differences?

This presentation will discuss ways we can be more strategic in modeling roughness values to account for mature vegetation, ideas for documenting roughness values to better inform how we manage vegetation, and will look at case studies of various streams to illustrate how sensitive flood elevations can be to changes in roughness.

SESSION 7

Beyond Design: a Construction Manager's Perspective

By Joe Williams, Steve Materkowski, Jason Stawski, and Mike Sarmento, UDFCD

ABSTRACT:

Many of us don't have the opportunity to go out into the field as much as we would like and we miss out on a very important aspect of our jobs, Construction! Fortunately, at UDFCD we have Construction Managers who have strong field presence and knowledge-base to keep the project team informed and engaged throughout the project life-cycle. During this session we will share a construction perspective on a few relevant topics.

SOIL LIFTS TOP TEN LIST

By Joe Williams

Soil lifts are being incorporated into more designs as they offer a flexible option for bank edge treatment that can adjust to the changes in the stream. The challenge with soils lifts is they are a customized tool based on site conditions, and need to be designed and installed with specific stream goals in mind. With numerous projects in the ground, UDFCD has a good understanding of a successful formula for soil lift installation. Joe Williams will reveal the top ten list of things to consider when implementing soil lifts into your project.

FEMA FLOOD REIMBURSEMENT, TO DO OR NOT TO DO, THAT IS THE QUESTION

By Steve Materkowski, EIT, CPESC, and Jason Stawski, EIT

After the continual high flows experienced on the South Platte River this Spring and large summer storms, several systems suffered considerable damage. The City and County of Denver applied for Federal Emergency Management Agency (FEMA) assistance for their recovery efforts. Since UDFCD, on behalf of Denver, manages several stream management activities that involve the clean-up effort, we have had first-hand experience in the process. FEMA assistance should always be considered in a flood recovery situation, and a more thorough understanding of what is actually involved, the better. Steve Materkowski and Jason Stawski will share their perspective from working to help the City of Denver submit a claim for flood damages, and provide insight to the FEMA reimbursement administration.

MEP FINAL ACCEPTANCE: SITE STABILITY AND REVEGETATION

By Mike Sarmento, SET

There are three phases to receiving maintenance eligibility as a part of the MEP: design approval, construction approval, and final acceptance. Many local governments, developers, and contractors mistakenly believe that once construction approval is received that the project is automatically eligible. Not so!!! Final acceptance may take several years depending on when the site exhibits structural stability and successful revegetation is the key. Mike Sarmento will discuss the importance of this often overlooked component and provide guidance on how to obtain that final certification in an ecologically-sound, as well as cost and time efficient manner.

Analyzing the Effects of Stormwater Detention on Water Balance and Water Rights along the Colorado Front Range

By Andrew Earles, PhD, and Adam Kremers, Wright Water Engineers

ABSTRACT:

This study presents the results of a long-term hydrologic modeling study on the effects of full spectrum detention on downstream water rights users. Full spectrum detention (FSD) is intended to reduce the flooding and stream degradation impacts associated with urban development by controlling peak flows in the stream for a range of events.

FSD addresses limitations of traditional minor and major storm detention by controlling peak discharges over the full spectrum of runoff events from small, frequent storms up to the 100-year flood. FSD facilities produce outflow hydrographs that, other than a small release rate of the excess urban runoff volume (EURV), mimic the shape of pre-development hydrographs. FSD modeling has been shown to reduce urban runoff peaks to levels similar to pre-development conditions over an entire watershed, even with multiple independent detention facilities. Because FSD capture and slowly release runoff, water rights users in the State of Colorado have raised questions related to evaporative losses of stored water and the timing and magnitude of releases.

The objective of this investigation was to perform continuous simulation hydrologic modeling to evaluate changes in hydrology due to development with varying levels of imperviousness with and without FSD and how these changes affect downstream water rights users. Stormwater Management Model (SWMM) simulations were conducted for undeveloped, 20%, 35%, 50%, 65%, and 80% imperviousness scenarios, with and without FSD. The results of these SWMM model scenarios were used to evaluate the site water balance and to develop time series flow data for input into a water rights model to determine how downstream users would potentially be affected by the various scenarios.
Water rights owners along the Front Range of Colorado are collaborating to address the increasing future demands of the over-appropriated South Platte Basin as part of the

Colorado Water Plan. Senate Bill 15-212 has raised concerns that FSD operations may reduce stream flows due to evaporative losses and modify the timing of available water from flood flows for junior water rights users causing increased supply gaps for the most agriculturally productive basin in the state. As a result, this water balance assessment and water rights analysis shows the timing and volume effect of temporary storage of urban runoff peaks for water users in the Big Dry Creek basin that would have otherwise been unable to divert water because of FSD.

SESSION 9

Adventures in Master Planning

By Shea Thomas, UDFCD

ABSTRACT:

There's a lot going on in the world of master planning. As drainage and flood control projects have grown in size and scope, so have the associated components recommended in a master plan. UDFCD rarely manages a construction project that consists only of infrastructure; most projects are multi-functional, multi-purpose ventures that provide various amenities to the community in addition to flood protection. Our relationships with other departments within local government offices have grown, including parks and recreation, transportation and urban planning in an effort to better utilize public space to serve the community with more than just a single purpose.

In recent master plans, we've had to get creative in finding solutions to difficult flooding problems, whether in fully developed urban areas or undeveloped watersheds with unstable drainageways, in order to reduce risk to residents and fulfill our goal of being good stewards of the drainageways by preserving or restoring healthy riparian corridors. This presentation will examine some of the unusual situations and planning elements that have gone into recent master plans that helped the communities involved achieve their goals and may offer insight or ideas for other communities with similar situations. From Aurora to Lakewood, Thornton to Douglas County, local governments have been receptive to trying new approaches to decades-old problems by first developing a plan that we can then implement together in the future.

SESSION 10

Update on Regional Hydrologic Investigations

By Ken MacKenzie, UDFCD and Gerald Blackler, Ph.D, Enginuity

ABSTRACT:

UDFCD and its partner communities along the South Platte River and Clear Creek have recently embarked on major revisions to the hydrologic models that define the regulatory flooding limits on these two major waterways, resulting in two Conditional Letters of Map Revision (CLOMRs). The preliminary results of these CLOMRs show reduced flood flows and will result in more accurate flood predictions and more effective use of flood mitigation tax dollars.

Additionally, work on a major recalibration of the Colorado Urban Hydrograph Procedure (CUHP) continues. This last year's recalibration effort included an extensive review of viable calibration gages, development of storms with Gage Adjusted Radar Rainfall (GARR), and extensive testing of multiple calibration parameters. Rainfall depths from the GARR were put into CUHP to compare computed flows with recorded runoff for an array of basins within the District. Each storm event tested CUHP's performance when a large single or multiple basin analysis is applied versus smaller basins averaging 100 to 120 acres, which are commonly used for Major Drainageway Plans (MDPs) or Outfalls System Plans (OSPs). These results lead to the development of calibration parameters that effect peaking, timing, and also flow routing within CUHP and SWMM. These parameters are currently being tested with design storm events to understand how they compare to the return frequency of design storms commonly used in the planning process. This portion of the presentation will cover steps taken in the re-calibration process, observations noted during the effort, and provide a brief update on the study's progress.