1:00 – 2:30 pm Afternoon breakout sessions I

Ballroom

Missouri River Management Breakout Session (35 minutes to present, 10 minutes for audience questions)

The Missouri River Flood Information System

Nicolás Velásquez has been an Assistant Researcher at the Iowa Flood Center (IFC) since 2018. He is part of the development and evaluation team in charge of the hydrological model. Nicolás has developed and implemented various modules to represent subsurface artificial drainage, snow processes, and the development of parameterization methodologies. Before his work at the IFC, Nicolás served as the leader of the Hydrology group in the Environmental Alert System of the Aburrá Valley. During this period, he worked on his doctoral thesis and was a guest lecturer at different universities in Medellín, Colombia (his home city). Additionally, Nicolás has experience as an independent consultant, working on hydrology projects in different regions of the country.

Levee Setbacks: A Not-So-Simple-but-Worthwhile Endeavor

Andrea Gebhart, AICP, is the Community Engagement Manager at JEO Consulting Group, where she designs and implements public participation strategies for a wide range of civil engineering and planning projects. As a certified community planner with experience in communications, Andrea strives to make each project she works on accessible and engaging to communities, specifically those most affected by the project. Her project work includes water resources projects like watershed planning, flood resiliency planning, and flood risk reduction awareness. Notably, she was the project manager for the development of The Nature Conservancy's Large-Scale Levee Setback Playbook, leading the facilitation and documentation of the multi-agency experience and lessons learned from a levee setback project on the Missouri River following the 2019 flood event.

Dan Fricke, PE, is a project manager, senior engineer, and levee expert in the Water Resources Engineering department at JEO Consulting Group. He helps to lead a team of over 40 professionals focused on reducing natural hazard impacts and enhancing water resources. Dan's career focus has been levees and large-scale flood risk reduction evaluations, strategy development, and implementation for communities in multiple states, including Federal Emergency Management Agency (FEMA) flood hazard mapping, NFIP levee data certification, as well as U.S. Army Corps of Engineers (USACE) collaboration and Section 408 permitting. In addition to structural measures, Dan champions addressing residual risk through proactive emergency preparedness planning and public risk awareness outreach.

Ballroom West

Tools for Water Management I Breakout Session (25 minutes to present, 5 minutes for audience questions)

Nebraska Clearinghouse

Dave Miesbach, Groundwater Section Supervisor, Water Well Standards at the Nebraska Department of Environment and Energy

R app for groundwater quality

Mikaela Cherry, USGS. Mikaela is a Physical Scientist for the U.S. Geological Survey Nebraska Water Science Center in Lincoln, Nebraska. She works on groundwater age dating and how it can be used to better understand groundwater contamination. She received her PhD in Natural Resources with a Hydrologic Science Concentration, University of Nebraska-Lincoln. Her M.S. in Geography from University of Victoria, and B.S. in Watershed Science from Colorado State.

Design Hydrographs in Small Watersheds from General Unit Hydrograph Model and NRCS-NOAA Rainfall Distributions

It is time to shift our paradigm of small watershed design from a graphic (or tabular) to a theoretical method, because (1) the recent general unit hydrograph (UH) model can convert a design hyetograph to a design hydrograph simply, accurately, and theoretically; (2) the Natural Resources Conservation Service (NRCS) has recommended that the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rainfall data of depths and distributions at a specific site, which is often called the NRCS-NOAA rainfall distributions, should be used for small watershed design if runoff data are unavailable; and (3) in this paper, we have presented a design procedure that formulates design hydrographs from the NRCS-NOAA Atlas 14 rainfall distributions and the general UH model automatically, using the MATLAB convolution function. A literature review indicated that the current practice for design hydrographs in small watersheds from hyetographs is laborious because both hyetographs and UHs are discrete. By contrast, the theoretical general UH model can significantly simplify this process. In this research, we first found analytic design hydrographs from rectangular and triangular hyetographs, which were next used to validate the MATLAB convolution method. We then proposed a double exponential rainfall distribution for both asymmetric and symmetric hyetographs. After that, we modified the symmetric exponential distribution model to describe NRCS-NOAA Atlas 14 data for site-specific hyetographs, which are finally convolved with the general UH model for site-specific design hydrographs, using the MATLAB convolution function. It is noteworthy that the proposed method extends the classic rational method from the peak discharge to the whole hydrograph; and it is valid for both continuous and discrete hyetographs. Hence, it provides a powerful tool in urban development, agriculture land use, roadway planning, and airport construction; it can also be used to evaluate an existing drainage system under various meteorologic–hydrologic conditions. Finally, we expect that this research will shift our current design practice and university UH teaching from an empirical to a theoretical paradigm in the near future.

Junke Guo, Associate Professor, UNL Department of Civil Engineering

Midlands Room

Wastewater and Sewer Systems Breakout Session (25 minutes to present, 5 minutes for audience questions)

The City of Omaha's Combined Sewer System

The City of Omaha operates a regional wastewater collection and treatment system, providing service for a majority of Douglas and Sarpy County. A vast majority of the collection system is a separate sanitary system, conveying separate sanitary flows to the Papillion Creek Water Resource Recovery Facility (WRRF). In those areas' stormwater is collected in its own pipe, with discharge directly to the receiving stream. The older parts of the collection system, built from the 1890's to about the 1950's, is comprised of a combined sewer system that collects in a single pipe system both sanitary flows and, during wet weather, stormwater flows. A majority of the combined system is treated at the City's Missouri River WRRF, with a small portion that which lies within the Papillion Creek Drainage area) is served by the Papillion Creek collection system and WRRF.

Omaha is one of over 800 communities across the nation that have a permitted combined sewer system. Along with those other communities, Omaha was required to develop a Combined Sewer Long Term Control Plan (CSO LTCP). It is often misunderstood that this is a sewer separation program, that is not the case, the federal mandate is to comply with the Clean Water Act, and specifically with the CSO Control Policy of the Clean Water Act. The CSO Policy requires communities with combined sewer systems (CSS) to reduce the amount of pollution in the receiving waters that can be attributed to the CSS.

This presentation will discuss some historical context on previous iterations of the CSO LTCP, first developed in 2009, and updated in 2014 and 2021, how things have changed since the first CSO LTCP, progress made to date, and the elements that remain to be completed of this $2.0 billion-dollar program that has made significant progress towards the goals of reducing the amount of pollution that the CSS once contributed to the Papillion Creek System and the Missouri River.

Jim Theiler, Assistant Director, City of Omaha Public Works

Wastewater, the Souther Sarpy Wastewater project, and its relation to development

Formed by the County and five cities of Bellevue, Gretna, LaVista, Papillion and Springfield, the Sarpy County and Cities Wastewater Agency (SCCWWA) was created in 2017 and is now overseeing construction of new gravity sewer lines, force mains and lift stations. This multiphase project will allow for development and expansion in Southern and Western Sarpy County that is currently expansion limited due to lack of wastewater services. This infrastructure will connect miles of wastewater infrastructure through gravity sewers, force mains, and lift stations from Gretna to Springfield to Bellevue

eventually conveying wastewater flow to Omaha's Papillion Creek Water Resource Recovery Facility (PCWRRF).

Currently, the first Phase of Work, Phase 1A, is under construction in eastern Sarpy County with the anticipated completion the end of 2024. This session will discuss general project information and provide the development community with current status on project deliver as well as allow for open Q&A.

Jeff Thompson, Project Engineer, Sarpy County and Cities Wastewater Agency. PE, CPESC, CFM

Monitoring for changes in the Missouri River downstream from combined sewers near Omaha, Nebraska 2012 – 2022

This presentation will summarize the water quality monitoring that has been done by the U.S. Geological Survey (USGS) on behalf of the City of Omaha from 2012 to 2022. With as little as a tenth of an inch of rain, Omaha's combined sewers have the capability to overflow into the Missouri River. In 2009, the City of Omaha began the implementation of their combined sewer overflow (CSO) Long-term Control Plan (LTCP) which addresses the impacts on the Missouri River and Papillion Creek of the CSOs. As part of this plan, the City of Omaha partnered with the USGS to collect water-quality data on the Missouri River from 2012 through 2022. This partnership looked to document changes in the water-quality of the Missouri River potentially related to the implementation of the City's LTCP. The monitoring was made up of both discrete and continuous data collection. Discrete data consisted of monthly sampling for nutrients, bacteria, biological oxygen demand, total suspended solids, and chlorine. Continuous data were collected using water-quality monitors located at three sites along the Missouri River to track water quality changes made to the river by the City. The monitors collected data every 15 minutes for water temperature, specific conductance, dissolved oxygen, pH, and turbidity. Through the discrete and continuous data, changes in the water quality from upstream to downstream were documented and quantified. In addition, E.coli concentrations were compared using statistical models. This presentation will share some of those monitoring and modeling results.

Matt Moser, USGS. I currently work as a Physical Scientist with water quality in the State of Nebraska and have been working with water in Nebraska for the past 18 years. I can assist you in collecting samples or monitoring water. I lead our continuous water quality monitoring network where we operate multi-parameter sondes in surface water. I design water quality monitoring stations to maximize the quality of data collected, troubleshoot any issue that arise, and approve the data that is collected. I have been operating water quality sensors for 15 years and have built up an extensive knowledge of how the equipment works and troubleshooting techniques to ensure accurate data. Parameters monitored continuously in the State include water temperature, specific conductance, pH, dissolved oxygen, turbidity, nitrate, chlorophyll, total algae, and others.