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*BRANCH WEBSITE:* [*http://branches.asce.org/wichita*](http://branches.asce.org/wichita)

*CALEB COLTRANE, PRESIDENT*

 *Garver¨ 316-221-3022¨ crcoltrane@garverusa.com*

*MACEE CROWELL, VICE PRESIDENT*

*Kirkham Michael 316-303-3026mcrowell@kirkham.com*

*DAKOTA McKEE, TREASURER*

*Gannett Fleming TranSystems 316-303-3051dmmckee@transystems.com*

*ALLISON ATKINSON, SECRETARY*

*U.S. Geological Survey 317-682-7977aatkinson@usgs.gov*

*SCOTT LINDEBAK, PAST PRESIDENT*

*Sedgwick County 316-660-1754scott.lindebak@sedgwick.gov*


## **ASCE September Meeting Minutes**

Speaker: Allison Atkinson, Civil Engineer

Topic: Enhancements to the U.S. Geological Survey Flood Inundation Mapper

Date: Wednesday, September 4, 2024

Location: Wichita Advanced Learning Library

 711 W 2nd St N

 Wichita, KS 67203

President Caleb Coltrane called the meeting to order at 12:00 pm and opened with announcements.

**Announcements**

* Officers were introduced
* A summary of the ASCE Wichita Branch coverage area was given
* Hands on engineering will be happening each month and we are looking for volunteers

President Caleb Coltrane introduced the speaker, Allison Atkinson, who is a civil engineer with the U.S. Geological Survey.

**Presentation Notes**

Abstract

Changes in climate patterns and land cover, in addition to the goal of maximizing limited municipal budgets for flood control, make it challenging for communities to assess the dynamic extent of potential flooding. The U.S. Geological Survey (USGS) Flood-Inundation Mapper (FIM) helps communities protect lives and property by illustrating riverine flooding on an interactive website based on user-driven input. Since the program began in 2002, the available tools have shifted from limited, event-specific dynamic mapping to a web service hosting data for multiple libraries. Recent development in the USGS FIM includes various enhancements enabling a project to be customized for a particular community. These enhancements include precipitation-driven (rather than just stage-driven) flood-inundation extents, the inclusion of National Weather Service Quantitative Precipitation Forecasting (QPF), and the display of streamflow velocities and water-surface elevations along with the standard depths. The precipitation-based FIM products provide dynamic flooding assessment for small (<100 square mile) basins which may lack National Weather Service flood forecasts and enable these communities to better predict the timing, extent, and depth of floods. Additionally, customizable enhancements also include the display of first floor elevations and time-of-travel along a river or stream. These value-added enhancements provide additional features for dynamic flooding predictions to assist decision makers with protecting life and property within their jurisdictions.

Presentation Notes

The FIM program has developed in stages beginning with a dynamic flood model in 2002 for Washington State. Subsequent stages include a model using LiDAR in North Carolina in 2007, a uniform FIM initiative driven by Midwestern flooding in 2008, and the development of websites, templates and coordination with the USACE and the NWS from 2010 to the present day.

The typical “stage-driven inundation maps” are accessible at <https://fim.wim.usgs.gov/fim/>. The website provides a few options for basemaps including NWS radar, satellite imagery, and AHPS forecast sites. Inundation extents can be viewed by clicking on a streamgage and manually adjusting a slider bar to select the streamgage stage for which one would like to view the inundation extents. After clicking on a streamgage, a box pops up which shows the real-time streamgage stage from NWIS and the NWS predicted stream gage stage. This information can be used to see current and predicted flood inundation extents. The HEC-RAS models used to develop the maps are calibrated to within ½-ft of a streamgage rating. A validation event on July 26, 2022 in Eureka, Missouri confirmed that predicted inundation extents and depths matched what happened in a flooding event.

The USGS FIM mapper program differs from the National Water Prediction Service (NWPS) inundation extents program in that the FIM maps are created with individual HEC-RAS models that are calibrated to a local streamgage. NWPS inundation extents are based on the National Water Model. The FIM Mapper program differs from the FEMA FIS studies in that it is easier to see inundation extents for each incremental stage on the mapper website as opposed to looking through a Flood Insurance Study document. Additionally, the USGS studies are non-regulatory.

Enhancements to the USGS FIM include 1) processing additional outputs from HEC-RAS (velocity and water surface elevations), 2) incorporating first floor elevations in to the HEC-RAS terrain, 3) displaying discharge at the nearest streamgage, 4) providing a table that shows the time of travel of a flood wave from gage to gage, 5) displaying historical flood peaks, and 6) providing HAZUS estimates for various inundation extents. HAZUS estimates are based on overlaying the inundation extents on top of the census blocks, require coordinating with FEMA, and are intended to provide a preliminary lost estimate based on predicted flooding.

Finally, precipitation-driven FIMs are also available. The USGS has completed one precip-driven FIM project, which can be viewed here: <https://cm.water.usgs.gov/fim-harrisonville-mo/#/>. Precip-driven FIMs enable FIMs to be developed for areas without a streamgage; calibration is instead completed by using pressure transducers and discharge measurements to get an event for an event calibration. Inundation extents are developed for various rainstorm depths and durations. On the website, viewers can use sliders to adjust the depth and duration to view flooding extents. Live feed from a rain gage is also available in order to see recent rainfall information. The precipitation-driven FIMs are moving towards including NWS Quantitative Precipitation Forecast (QPF) estimates and NWS Flash Flood Guidance (FFG) text products as well in order to provide more “real-time” flood inundation extent information.

Allison provided a demo of the FIM mappers, concluded the presentation, and then opened the floor for questions.

**Meeting Attendees**

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| --- | --- | --- | --- | --- | --- |
| 1 | Michael  | Armour | 18 | Charles | May |
| 2 | Eric | Armstrong | 19 | Dakota | McKee |
| 3 | Allison  | Atkinson | 20 | Philip | McKinney |
| 4 | Gregory | Baalman | 21 | Logan | Mills |
| 5 | Scott | Bernhardt | 22 | John | Oswald |
| 6 | Paul | Cater | 23 | Lynn | Packer |
| 7 | Caleb | Coltrane | 24 | Jessica | Rhein |
| 8 | Macee | Crowell | 25 | James (Mike) | Thompson |
| 9 | Ahmad | Farraj | 26 | Tyler | Ummel |
| 10 | Alan | Farrington | 27 | Sarah | Unruh |
| 11 | Nicole | Franken | 28 | Lukas | Vohs |
| 12 | Derek | Hake | 29 | Amy | Wegner |
| 13 | Wyatt | Hessman | 30 | John | Heinz |
| 14 | Kyle | Kerns | 31 | Ky | Louanghaksaphone |
| 15 | Derek | Kratzer | 32 | Harlan | Foraker |
| 16 | Scott  | Lindebak | 33 | Garrett | Reid |
| 17 | Dmitry | Lomachenko | 34 | Daniel | Schrant |
|  |  |  | 35 | Betrooz | Rahbar |

Meeting adjourned by President Caleb Coltrane at 1:00 p.m.

Minutes respectfully submitted by Secretary Allison Atkinson.