Introduction to 2D Mapping for Floodplain Managers

Jamie Reinke, PE, CFM NeDNR Floodplain Management Division Manager



Rules of the Road



Attendees will be muted during the presentation, to help eliminate background noise.



Use the chat to ask questions during the presentation.



For technical difficulties, send a private chat message to Michele York, or email *michele.york@nebraska.gov*

Thank you for joining us!



Polls

- Total of 4 poll questions. Your answers are anonymous
- If you are a Certified Floodplain Manager (CFM) or a Nebraska Municipality Treasurer requesting Continuing Education Credit (CEC) today, you must answer **all** poll questions. We will report only full participation
- Only the person registered and logged into Zoom will receive credit. If multiple people are viewing the presentation together, you will each need to log into Zoom using your unique link and answer the poll questions separately to receive credit

Why Flood Risk Reduction Makes Sense 1. Do you have projects underway to reduce your flood rist that you could use help with? a.Yes; b.No; c.No, but I could use some help getting something off the ground d.I'd like to know more about how you can help.	- 0	
 1. Do you have projects underway to reduce your flood rist that you could use help with? a.Yes; b.No; c.No, but I could use some help getting something off the ground d.I'd like to know more about how you can help. 	lood Risk Reduction Makes Sense	
 a.Yes; b.No; c.No, but I could use some help getting something off the ground d.I'd like to know more about how you can help. 	e projects underway to reduce your flood ri I use help with?	sk
 b.No; c.No, but I could use some help getting something off the ground d.I'd like to know more about how you can help. 		
 c.No, but I could use some help getting something off the ground d.I'd like to know more about how you can help. 		
O d.I'd like to know more about how you can help.	ould use some help getting something off the groun	ıd;
	now more about how you can help.	
Culumite	Colonia	

Agenda

- **01** Goals for Today
- 02 2D Studies in Nebraska
- **03** Differences in Modeling Methods
- **04** FEMA Regulatory Products
- 05 Additional Data & Uses



Goals for Today



Goals for Today

- Prepare communities for upcoming 2D studies in Nebraska.
- Introduce 2D modeling and the differences from 1D modeling.
- Highlight changes to regulatory data in 2D modeled areas.
- Additional data available in 2D study areas and highlighting its uses.



2D Studies in Nebraska



2D Base Level Engineering Studies in Nebraska



Data Development 2D Studies in Nebraska



Statewide 2D Studies in Nebraska



Differences in Modeling Methods



Differences in Modeling Methods

1D Modeling:

- One-directional flow, perpendicular to all cross sections.
- No defined time for hydrology simulation; set flow is computed through the cross sections until the result is within the allowable tolerance.
- Typically, steady state; flows change only when flow change locations are entered.
- Results available at cross sections and interpolated in areas between (most of area).



1D Modeling





Differences in Modeling Methods

2D Modeling:

- Utilizes a mesh grid with computation result in each cell.
- Multi-directional flow (unsteady); freely flowing from one area to adjacent areas within the modeled area.
- Hydrology defined according to storm event (ex. 1% annual chance) and duration (ex. 24-hour), which defines the simulation time.
- Results computed for each grid cell throughout the project area (less interpolation).



Sample Results





Flood Simulation



FEMA Regulatory Products



1D Study Flood Insurance Rate Map (FIRM)



- Lettered cross sections.
- Base flood elevation lines.
- Profile baseline (stream centerline).

2D Study Flood Insurance Rate Map (FIRM)

- Base flood elevation.
- Profile baseline (stream centerline).
- Evaluation lines replace cross sections.
 - Published base flood elevations.
 - Select evaluation lines lettered for Floodway Data Table.



2D Study Floodways

- Floodways are no longer developed at cross sections and interpolated in between.
- 2D floodways consider:
 - Depth x Velocity.
 - Surcharge of -0.5 to 1.5 throughout the floodway extents, but between 0.0 and 1.0 at any insurable structure.
 - Average surcharge value along evaluation line of 1.0 or less.



Flood Insurance Study (FIS)

- No profiles for 2D studies.
- Floodway Data Table contains new footnotes.

Values reported are based on averages calculated across evaluation lines. Refer to model results grids

² Floodway computed by 2 dimensional model

LOCATION FLOODWAY ¹			FLOODWAY ¹		1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEE NAVD88) ¹			
CROSS SECTION ²	DISTANCE ³	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Α	531	1429	22353	3.3	1103.0	1103.0	1103.5	0.5
В	2452	1306	16585	3.5	1104.0	1104.0	1104.5	0.5
С	4483	1183	15151	4.1	1105.0	1105.0	1105.6	0.6
D	6747	2180	15285	3.2	1106.0	1106.0	1106.8	0.8
E	8191	1297	15597	4.4	1107.0	1107.0	1107.8	0.8
F	9256	1254	11911	6.1	1108.0	1108.0	1108.7	0.7
G	10007	1004	13504	5.3	1109.0	1109.0	1109.6	0.6
н	11229	617	9547	6.0	1114.0	1114.0	1114.6	0.6
1	13228	1819	25108	2.9	1115.0	1115.0	1115.5	0.5
J	16169	1551	17933	3.9	1116.0	1116.0	1116.9	0.9
к	18257	3437	29948	3.1	1116.8	1116.8	1117.6	0.8
L	19141	3046	30817	3.0	1118.4	1118.4	1119.1	0.7
М	22618	2518	29174	2.4	1120.5	1120.5	1121.1	0.6
N	25857	3525	27838	3.0	1121.0	1121.0	1121.5	0.5
0	27898	2521	27083	3.5	1126.7	1126.7	1126.7	0.0
Jodeled varia	ability in elev	verages calculated	surcharge ac	s. Refer to model re	odway	ed variability in eleva	ation and surcharge	across the floodw
² Floodway o ³ Feet above	e a location 2.0 miles	sional model downstream of Sta	te Hwy 50		F	loodway Dat	a	
	JOHNSON COUNTY, NE							

Additional Data & Uses



Additional Data

- Point and click depth information.
 - Available on NeDNR's interactive map for the 1% and 0.2% annual chance events.
- Velocity data.
- Flood simulations.



How Can You Use this Data?

- Permitting
- Planning
- Grant Development
- Land Development Decision Making
- Outreach and Community
 Awareness & Education
- Post-Disaster Operations



Questions?

Elijah Kaufman, CFM elijah.kaufman@nebraska.gov 402-471-0640

Jamie Reinke, PE, CFM jamie.reinke@nebraska.gov 402-471-3957

Erin Wendt erin.wendt@nebraska.gov 402-471-0572 Anna Crist anna.crist@nebraska.gov 531-510-2320

Mercy Kipenda mercy.kipenda@nebraska.gov 402-471-3947

Isabella Bialas isabella.bialas@nebraska.gov 531-893-1065 Michele York michele.york@nebraska.gov 402-471-1214

