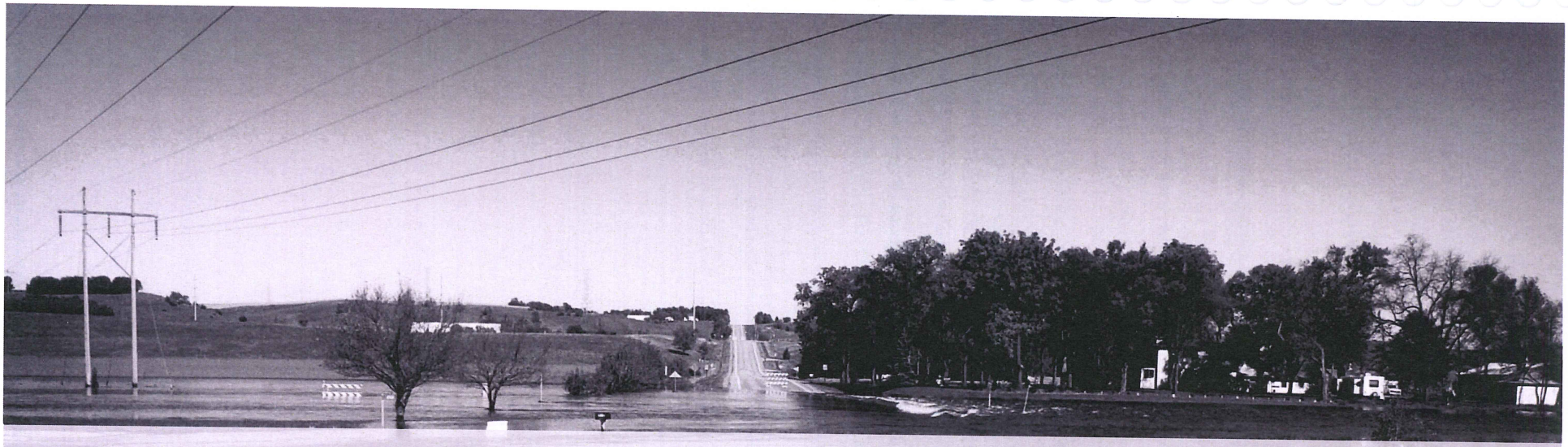


Developing a Hydrologic and Hydraulic Model of the Big Sioux River Basin

November 2, 2016

RESPEC

Outline

- Introduce Project Team
- Discuss Existing Products We Intend to Leverage
- Discuss Technical Approach
- Discuss Calibration Sites, Inundation Mapping Reach Sections, and Known Data
- Discuss Schedule

"Project Team"

BANNER
Engineering | Architecture | Surveying

- *Field Work*
- *Surveying*

RESPEC

- *Hydrology*
- *Big Sioux Knowledge*

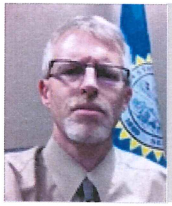
Iowa Flood Center

- *Web-Based FIS*
- *Visualization*

DAVID FORD CONSULTING ENGINEERS

- *Hydraulics*
- *Levees*

Team Contact Information



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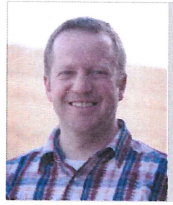

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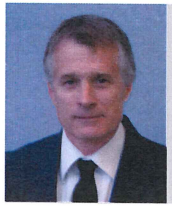

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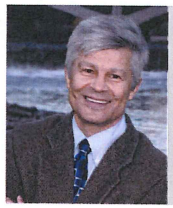

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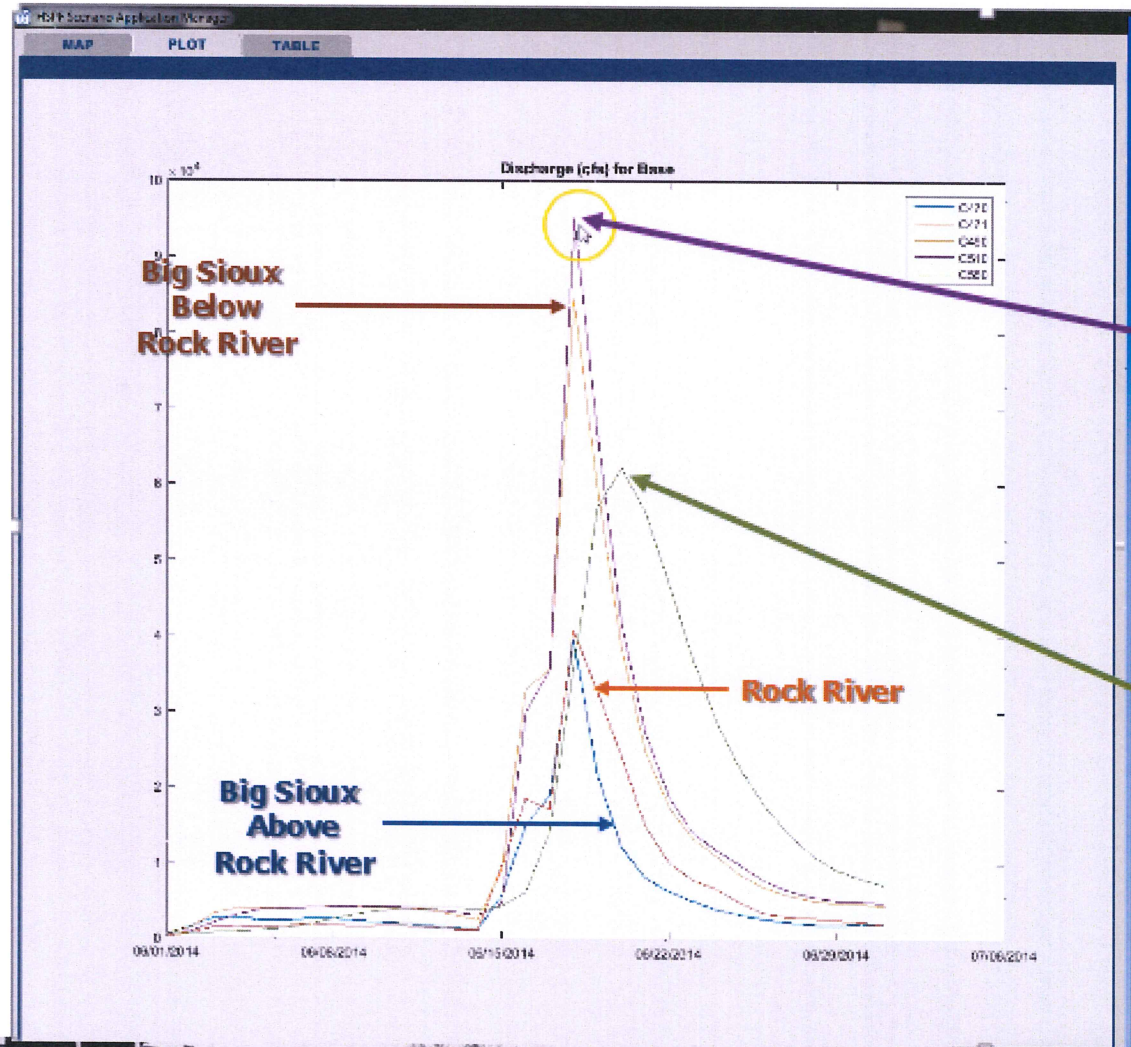
Existing Products to Leverage:

HSPF Model Application of Big Sioux River

Iowa Flood Information System (IFIS)

HSPF Model of the Big Sioux River Watershed

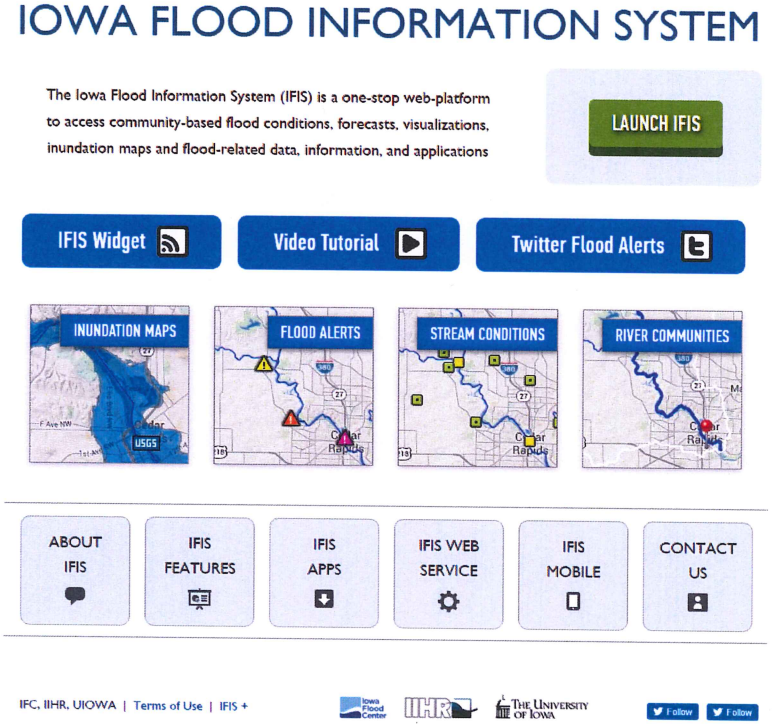
City of Sioux Falls/South Dakota Department of Natural Resources



We Know the Big Sioux

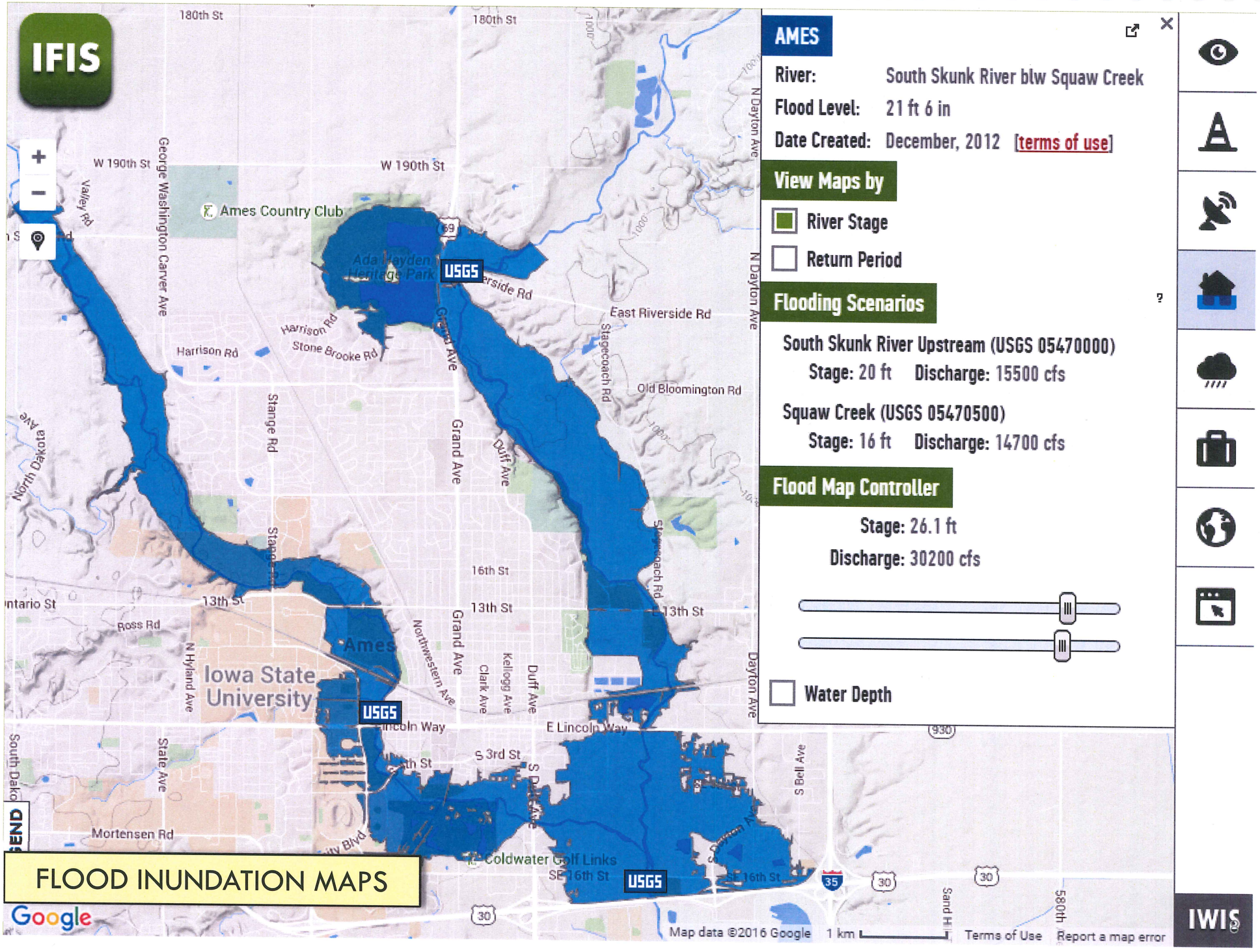
RESPEC

Iowa Flood Information System (IFIS)

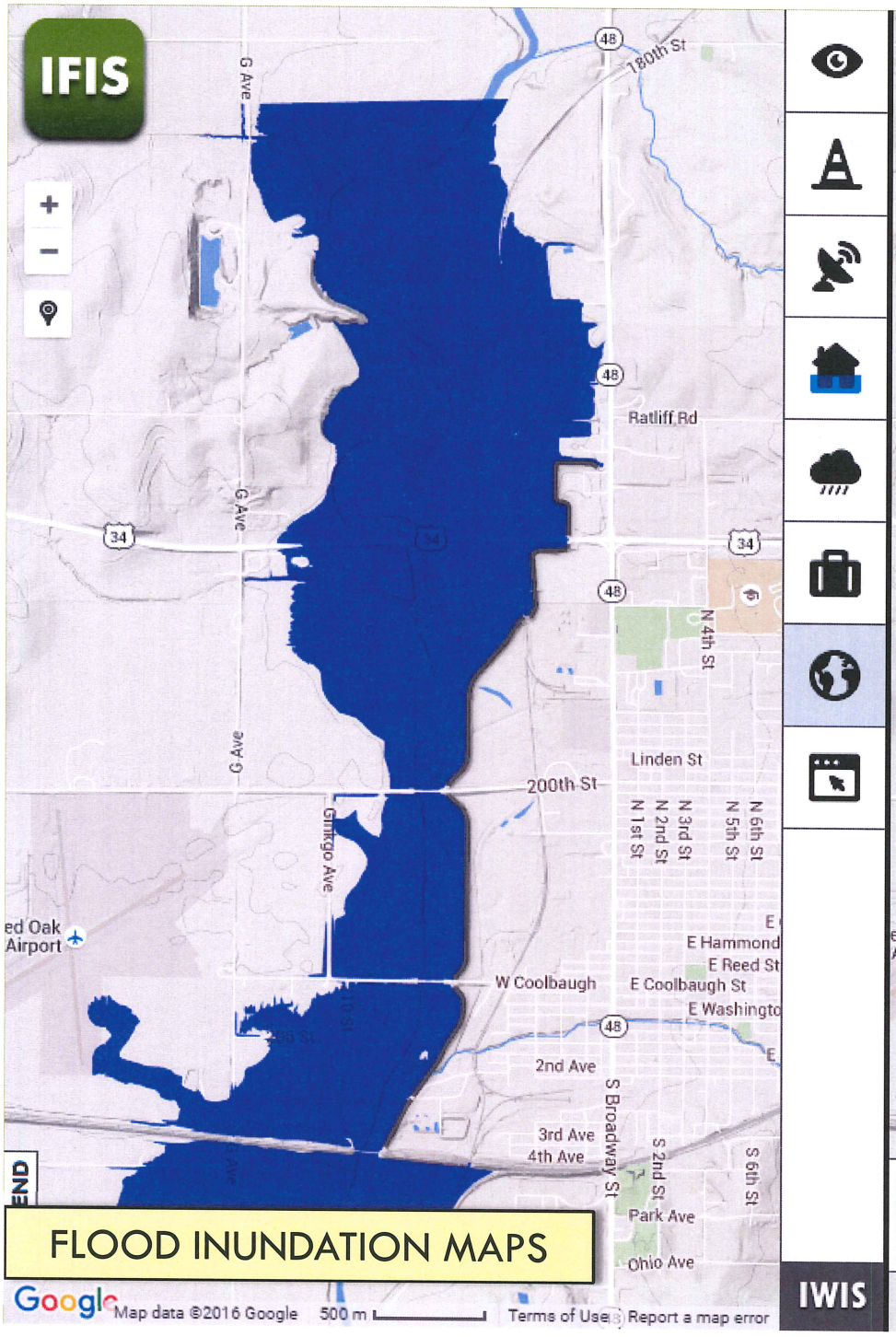


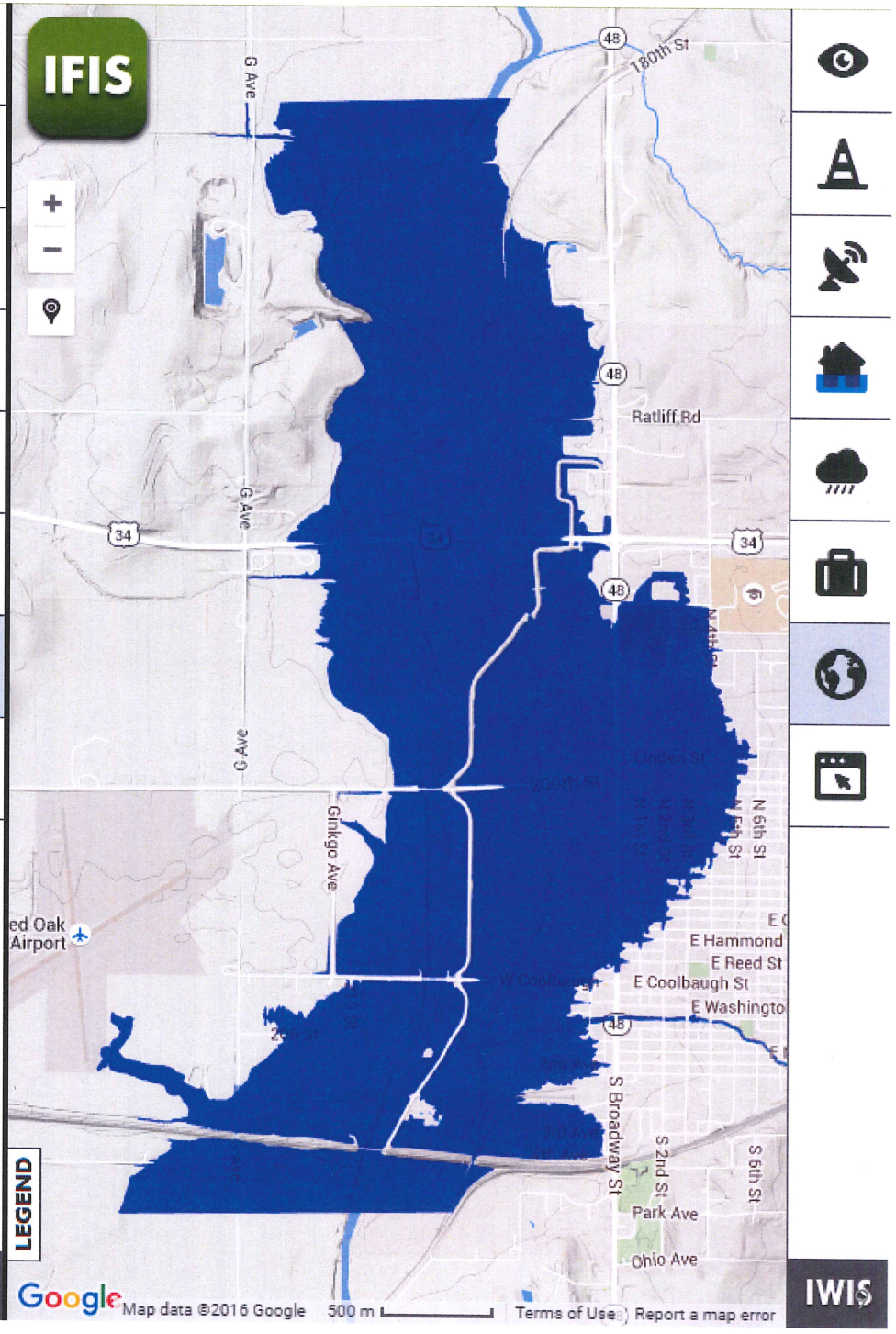
The IFIS developed by the Iowa Flood Center—a one-stop web-platform to access community-based flood conditions, forecasts, visualizations, inundation maps and flood-related data, information, and applications

"RESPEC has teamed with IFC so that South Dakota can partner with Iowa in ***building a technology that truly benefits the people who live in the Big Sioux River Watershed,*** *regardless of which state they live in."*

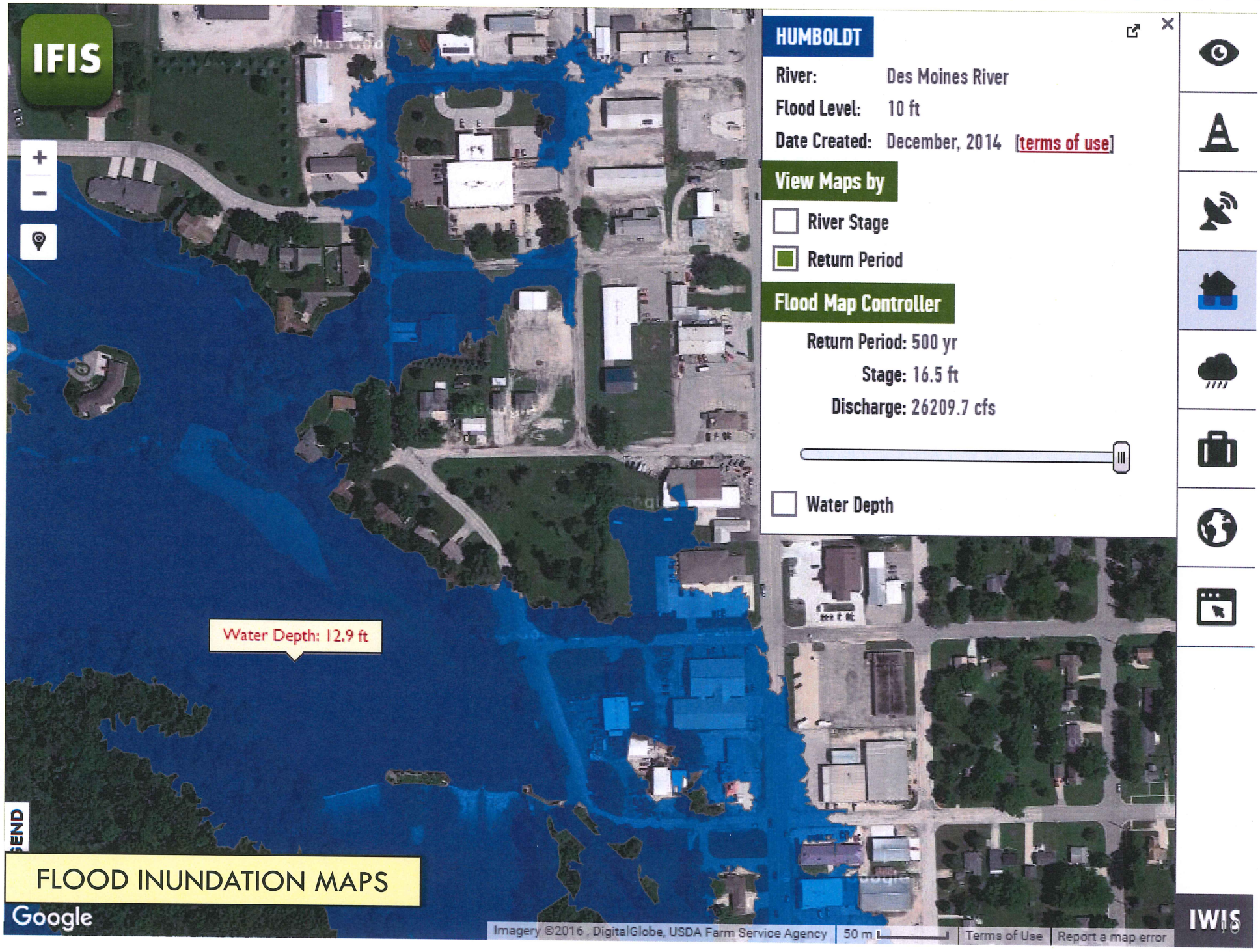


FLOOD INUNDATION MAPS





FLOOD INUNDATION MAPS


IFIS
HUMBOLDT
River: Des Moines River
Flood Level: 10 ft
Date Created: December, 2014 [terms of use]
View Maps by
River Stage
Return Period
Flood Map Controller
Return Period: 500 yr
Stage: 16.5 ft
Discharge: 26209.7 cfs
Water Depth
Water Depth: 12.9 ft
FLOOD INUNDATION MAPS
Google
Imagery ©2016 , DigitalGlobe, USDA Farm Service Agency
50 m
Terms of Use
Report a map error
IWIS

Technical Approach

H&H Modeling and Geospatial Analyses

For Flexibility: Design FIS capable of operating in 3 modes:

Design Mode

Quasi Real-Time Mode

Real-Time Mode

more robust

less robust

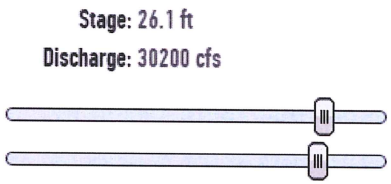
less complex

more complex

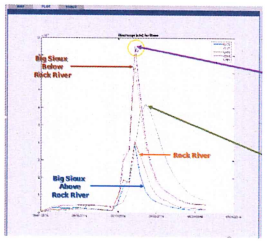
Technical Approach

Flood Information System (FIS)

Hydrology | **Hydraulics**



Pre-run



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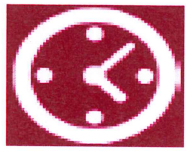
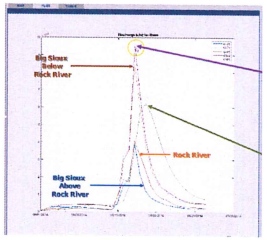
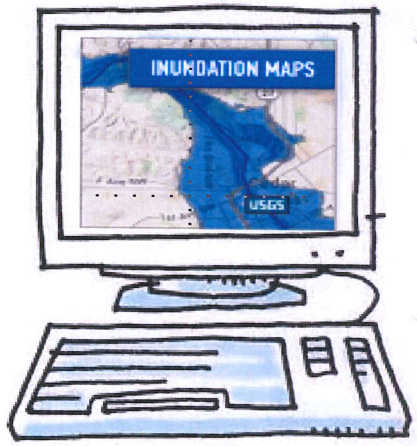




Live



Key Questions We Have

- What are the **critical reach sections** to provide river elevations and the resulting inundation?
- What hydraulic models and data exist to support inundation mapping in these sections?
  - HEC Hydraulic Models
  - Bathymetry, Top of Levee, Bridges
- What forecasts can be provided by the Agencies?
  - Weather, Hydrologic
- What products are expected by NWS?

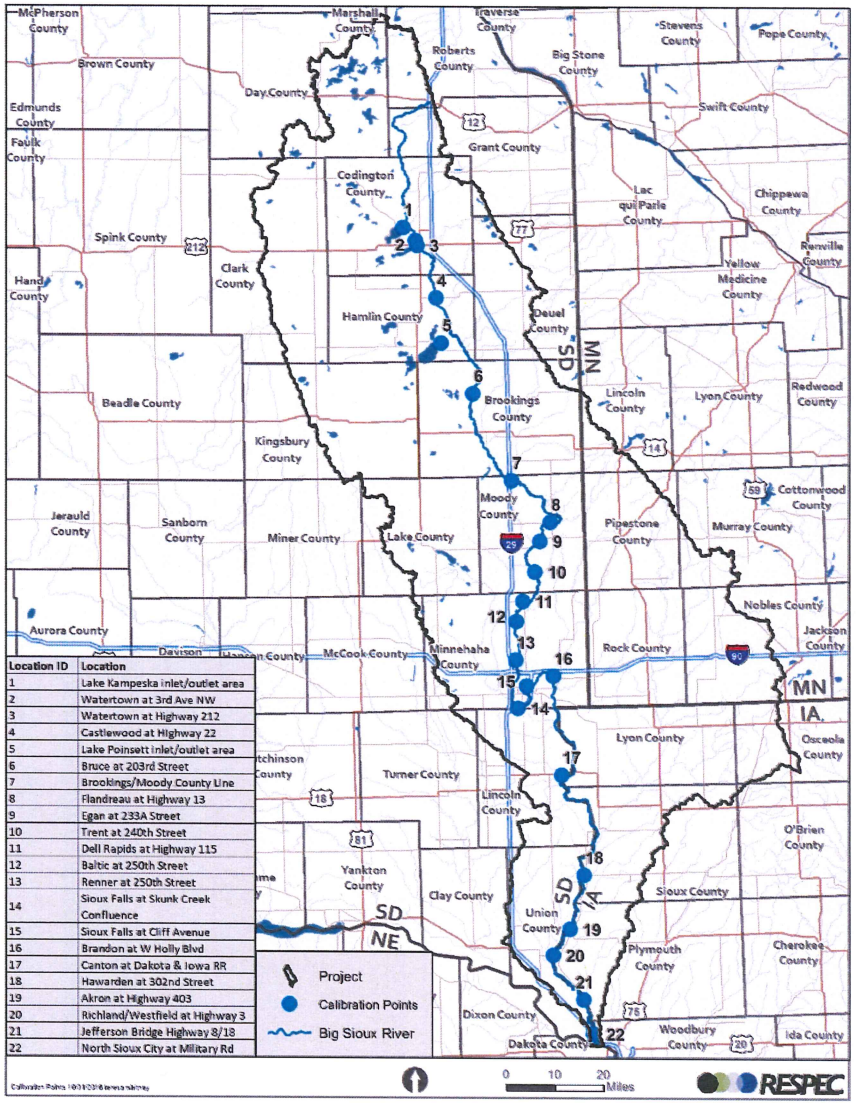
Additional Questions We Have

- What topographical scenarios should be evaluated in these sections?
- What gages and events should be used in the model application calibration and what criteria should be used to determine if the model application is acceptable?
- How many and where should stage sensors be located?

Calibration Sites

22 Sites Identified in RFP

1. Lake Kampeska inlet/outlet area
2. Watertown at 3rd Avenue NW
3. Watertown at Highway 212
4. Castlewood at Highway 22
5. Lake Poinsett inlet/outlet area
6. Bruce at 203rd Street
7. Brookings/Moody County line
8. Flandreau at Highway 13
9. Egan at 233A Street
10. Trent at 240th Street
11. Dell Rapids at Highway 115
12. Baltic at 250th Street
13. Renner at 258th Street
14. Sioux Falls at Skunk Creek confluence
15. Sioux Falls at Cliff Avenue
16. Brandon
17. Canton
18. Hawarden, IA
19. Akron, IA
20. Richland
21. Jefferson Bridge
22. North Sioux City

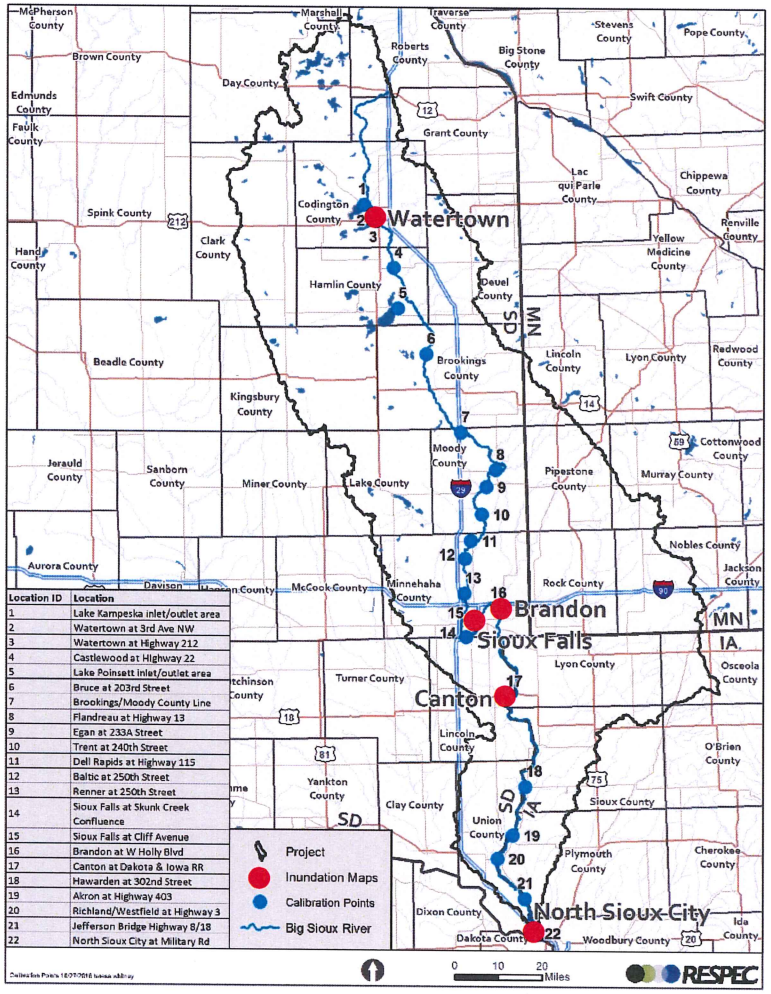


Location ID	Location
1	Lake Kampeska inlet/outlet area
2	Watertown at 3rd Ave NW
3	Watertown at Highway 212
4	Castlewood at Highway 22
5	Lake Poinsett inlet/outlet area
6	Bruce at 203rd Street
7	Brookings/Moody County Line
8	Flandreau at Highway 13
9	Egan at 233A Street
10	Trent at 240th Street
11	Dell Rapids at Highway 115
12	Baltic at 250th Street
13	Renner at 250th Street
14	Sioux Falls at Skunk Creek Confluence
15	Sioux Falls at Cliff Avenue
16	Brandon at W Holly Blvd
17	Canton at Dakota & Iowa RR
18	Hawarden at 302nd Street
19	Akron at Highway 403
20	Richland/Westfield at Highway 3
21	Jefferson Bridge Highway 8/18
22	North Sioux City at Military Rd

Inundation Mapping Locations

5 Sites Identified in RFP

1. Watertown
2. Sioux Falls
3. Brandon
4. Canton
5. North Sioux City



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19	Akron at Highway 403
20	Richland/Westfield at Highway 3
21	Jefferson Bridge Highway 8/18
22	North Sioux City at Military Rd

2 *months* | **6** *months* | **7** *months*

Task Order 1 | Task Order 2

Planning Phase | ***Sprint 1*** | ***Sprint 2***

River Segment	FIS Mode	HEC-RAS Model Detail	FIS Mode	HEC-RAS Model Detail
Missouri River—Akron		2D Prelim		2D Final
Akron—Sioux Falls		1D Prelim		2D Prelim
Sioux Falls—Brookings		1D Prelim		1D Prelim
Brookings—Headwaters		1D Prelim		1D Prelim

18 *months*

24 *months*

Task Order 2 → Task Order 3

Final TO 2 Sprint

Final TO 3 Sprint

River Segment	FIS Mode	HEC-RAS Model Detail	Real-Time Mode
Missouri River—Akron		2D Final	
Akron—Sioux Falls		2D Final	
Sioux Falls—Brookings		2D Prelim	2D Final
Brookings—Headwaters		2D Prelim	2D Final