

UPPER MISSISSIPPI RIVER SYSTEM FLOW FREQUENCY STUDY UPDATE

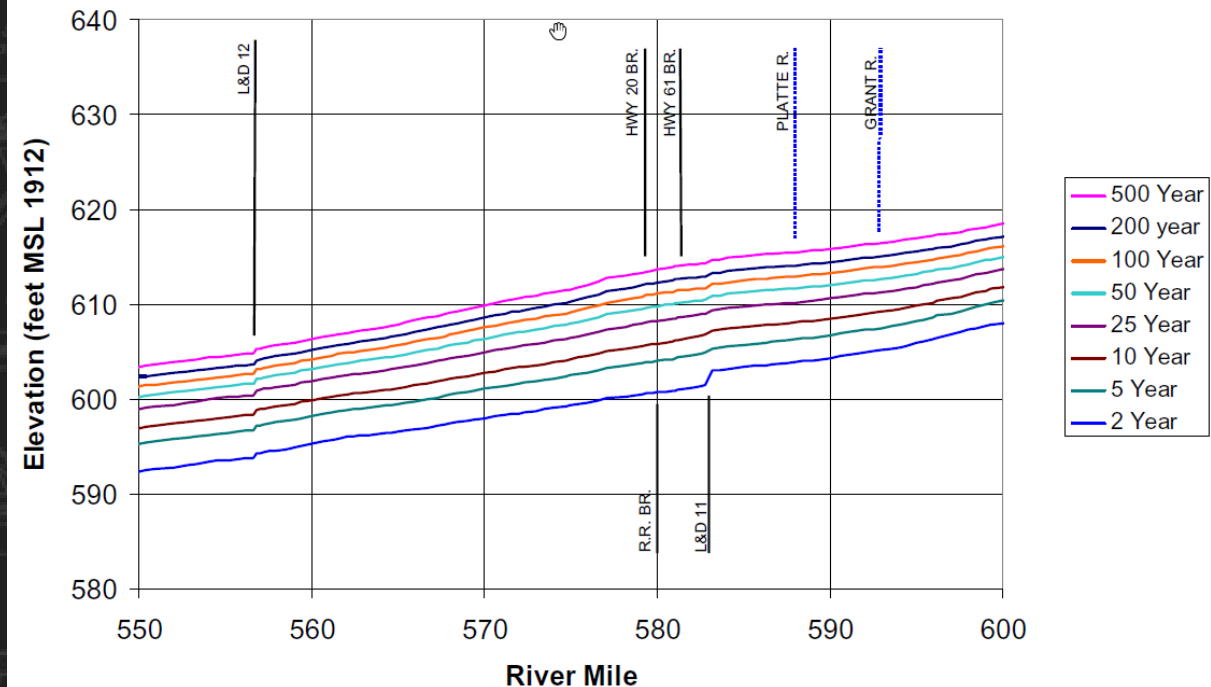
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Rock Island District



2003 Mississippi River Stage Frequency Profiles



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UMRS FLOW FREQUENCY STUDY

STUDY OVERVIEW



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Objective: improve confidence and reliability of flow frequencies on the UMR and IWW to support flood risk management planning and communication and the USACE Dam and Levee Safety Programs

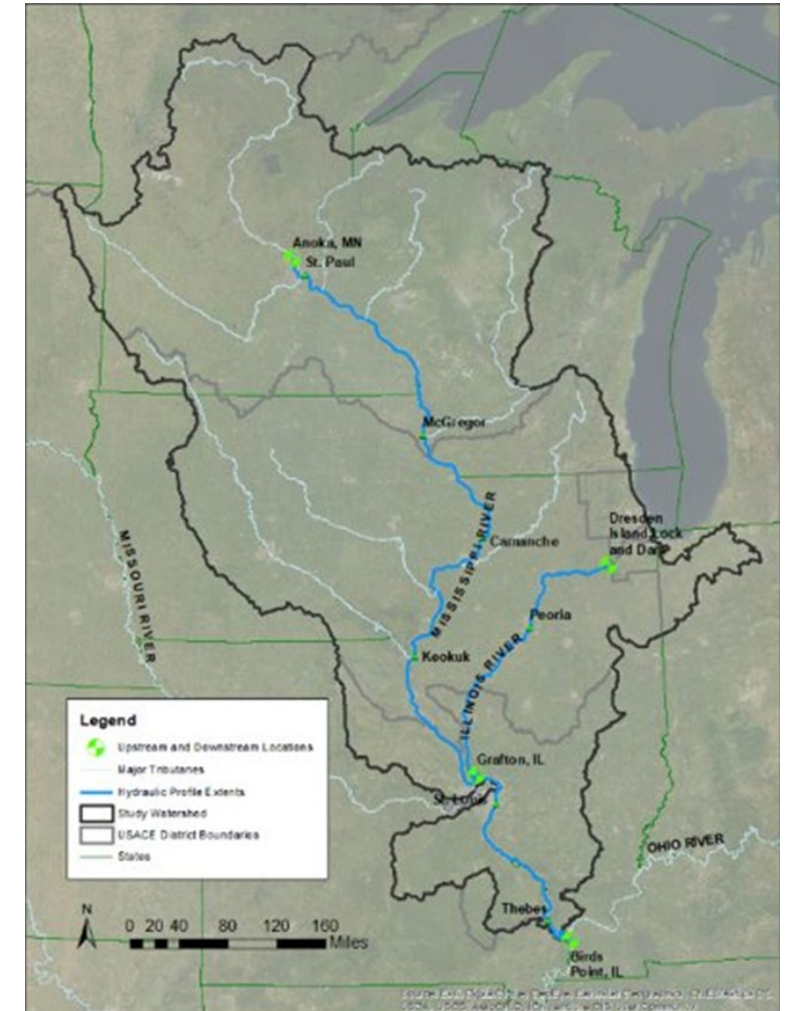
Study Area: Birds Point, MO (RM 0.0) to Anoka, MN (RM 864.8) of the Mississippi River, and from Grafton (RM 0.0) to Dresden Island Lock and Dam (RM 271.5) on the Illinois River

Products:

- Regulated and unregulated flow-frequency curves and
- Hydraulic profiles will be developed along the mainstem of the Mississippi and Illinois Rivers
- Final report and documentation

Potential Future Applications:

- Flood impact analyses
- Flood resiliency alternative evaluations
- Life safety considerations
- Economic impact predictions



- * The last UMRS FFS was published in 2004 and covered the period of record up through 1998.
- * UMR significant flooding in 2001, 2008, 2011, 2013, 2014, 2018, and 2019.
- * Illinois River 5 of the 10 highest flood crests have occurred since 1998, including the record crest in 2013.



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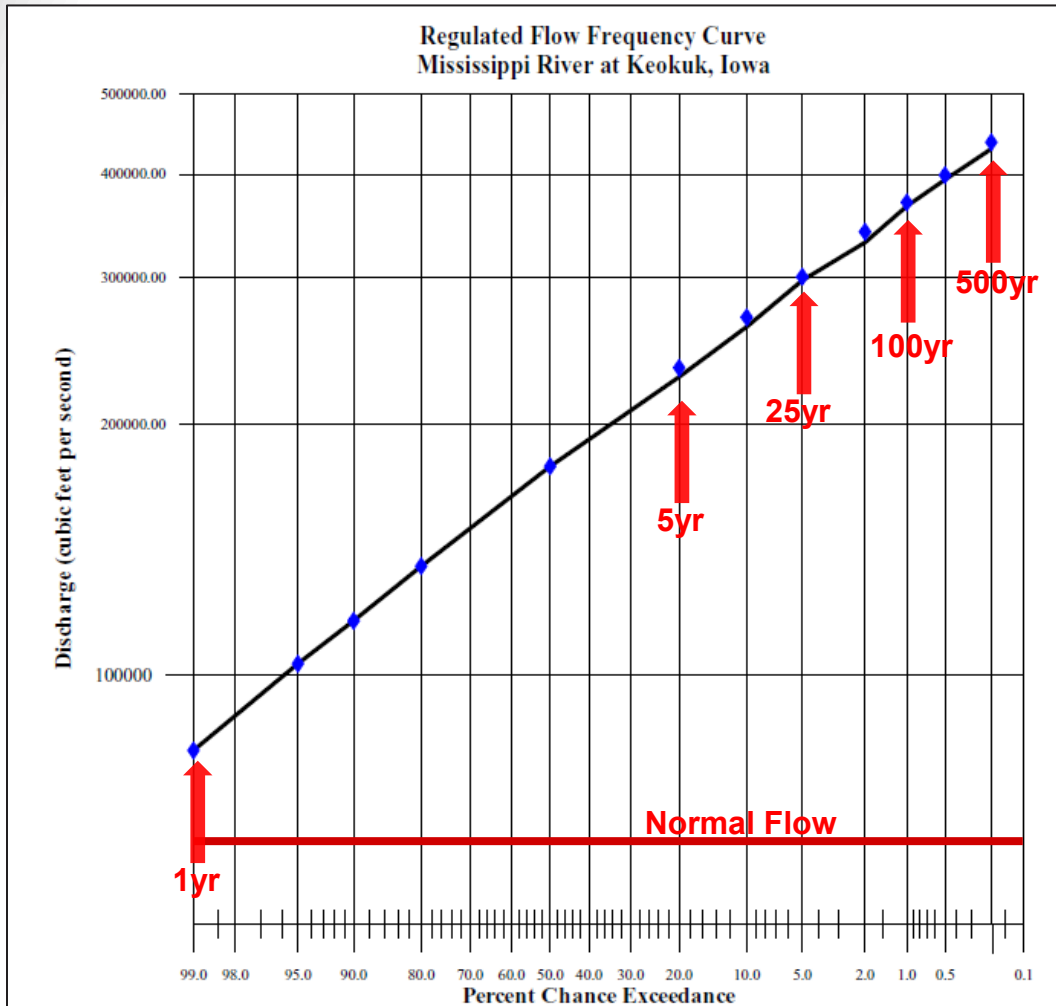
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STUDY DETAILS

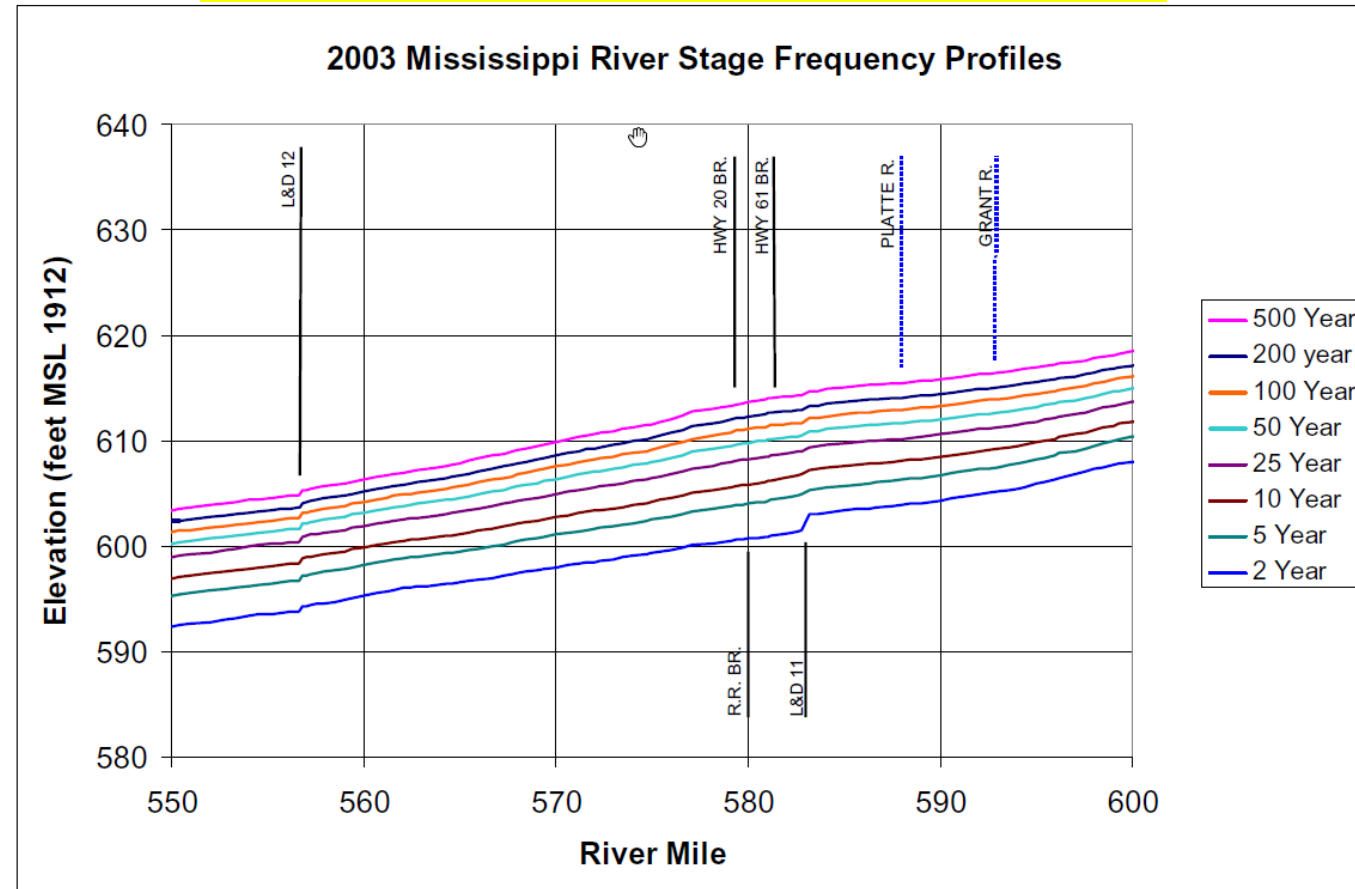


Flood frequency means the probability of a flood occurrence which is determined from statistical analyses. The frequency of a particular flood event is usually expressed as occurring, on the average once in a specified number of years or as a percent (%) chance of occurring in any given year.

MAINSTEM GAGE DATA



WATER SURFACE ELEVATIONS

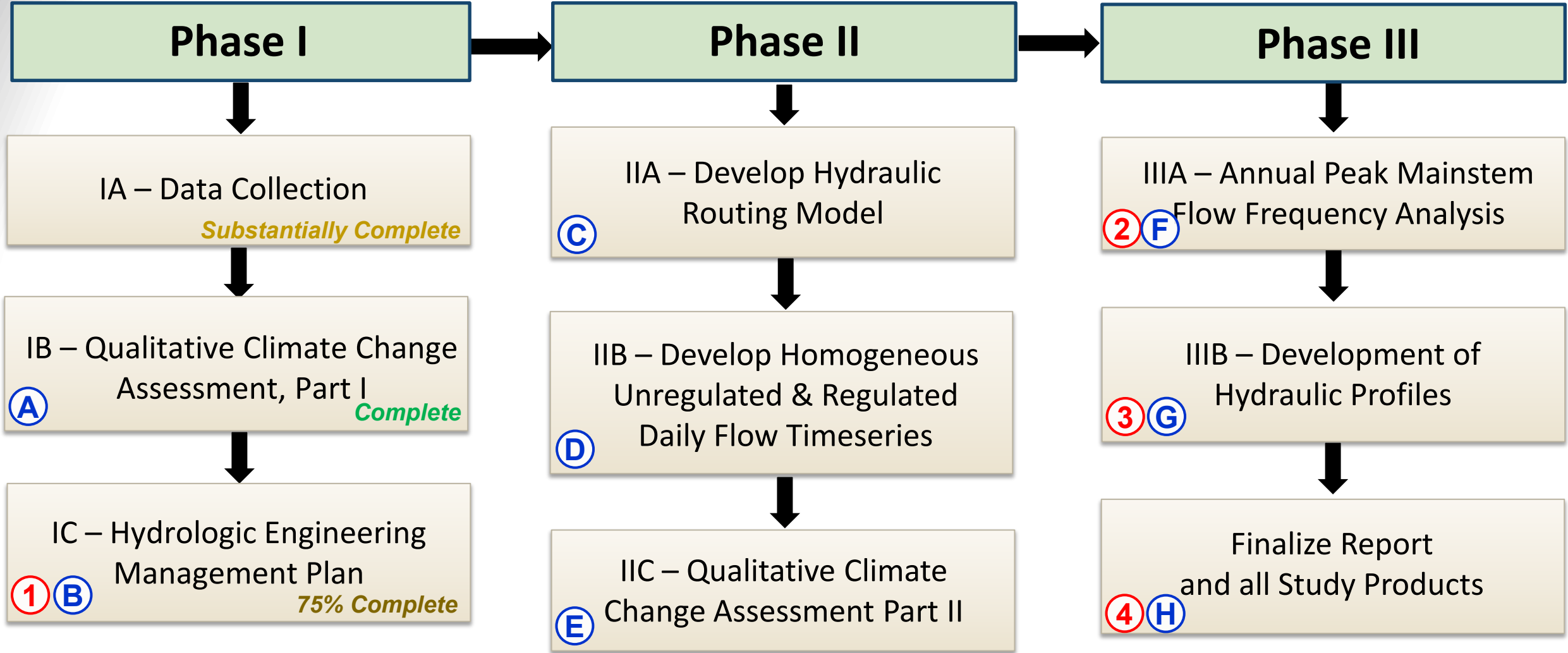


The UMR FRM Hydraulic Model that was developed from 2017-2022 will be used as the base model for developing the hydraulic profiles for this study



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UMRS FLOW FREQUENCY STUDY STUDY PHASES AND PRODUCT REVIEWS



Expert Reviews: (A) Climate I; (B) HEMP; (C) Hydraulic Model; (D) Homogeneous Flow; (E) Climate II; (F) Frequency Curves; (G) Hydraulic Profiles; (H) Final Report

Stakeholder/Public Reviews: (1) HEMP; (2) Frequency Curves; (3) Hydraulic Profiles; (4) Final Report

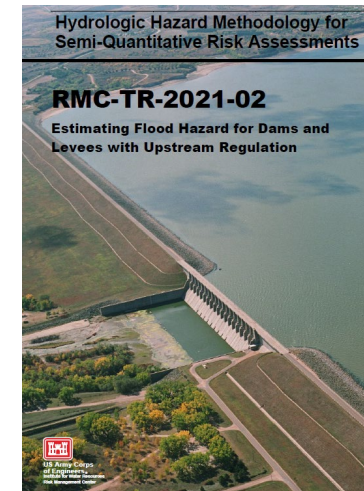
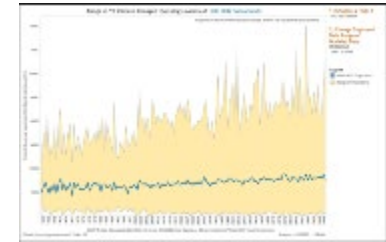
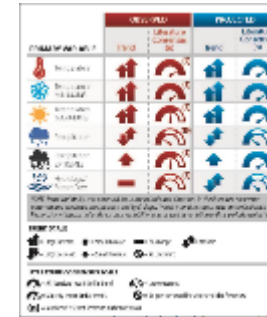
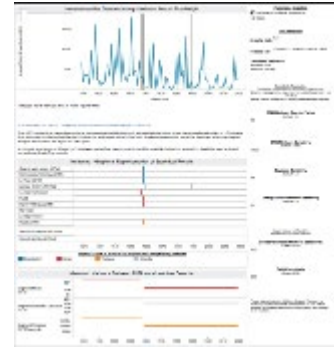
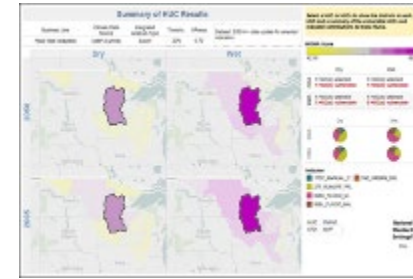


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UMRS FLOW FREQUENCY STUDY DATA INVENTORY AND HEMP



- **Data Inventory:** All gages needed for frequency analysis, past studies, watershed context (e.g., historic flood data, land use/land cover history, paleoflood data), hydraulic structure inventory, available models (RAS, HMS, CWMS, ResSim)
- **Hydrologic Management Plan Development (HEMP):** developed near the beginning of the study to document the methods and alternatives for approaching the flow frequency analyses and producing the final study products. The goal of the document is to expand on and clarify any assumptions and unknowns in the Scope of Work (SOW). This will ensure concurrence on the study methodology.





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CLIMATE CHANGE ASSESSMENT



Scientific evidence shows that climate change has shifted the climatological baseline about which natural climate variability occurs and may be changing the range of that variability as well. Long-term, natural fluctuations in climate or anthropogenic driven climate change can alter regional precipitation, temperature, and hydrology patterns.

Phase I of the Climate Change Assessment completed in 2022

- Followed U.S. Army Corps Guidance on incorporating climate change impacts to inland hydrology
- Completed a literature review of peer reviewed research regarding trends in the UMR region
- Analyzed observed temperature, precipitation, and streamflow (gages not impacted by regulation) at various representative gages throughout the UMR basin
- Trends in projected, future streamflow were analyzed

Phase II of the Climate Change Assessment (Phase IIC) will look at unregulated datasets downstream of FRM dams

REFERENCES: USACE Engineering Construction Bulletin (ECB) 2018-14, *Guidance for Incorporating Climate Change Impacts to Inland Hydrology in Civil Works Studies, Designs, and Projects* (USACE, 2020), as well as USACE Engineering Technical Letter (ETL) 1100-2-3, *Guidance for Detection of Nonstationarities in Annual Maximum Discharges* (USACE 2017a).



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UMRS FLOW FREQUENCY STUDY

SCOPE – SCHEDULE - BUDGET



- **Project Scope**

- Phase I – Data collection and HEMP Development (75% completed)
- Phase II – Data Analysis and Model Validation
- Phase III – Documentation – Flow frequency & Hydraulic Profiles

- **Project Schedule** (subject to efficient funding approx. \$1M/year)

- Phase I – Completion in FY 2024
- Phase II – Commence in FY 2024, Complete in FY 2026
- Phase III – Commence in FY 2026, Complete in FY 2027

- **Project Budget** (\$3.6M Total Estimated Cost) **FY21-23**, **FY24-25**, **FY25-27**

- Phase I - **\$765K** executed FY21-23. **\$175K** to complete in FY24
- Phase II - **\$825K** will achieve 60% completion by Mar 2025. Need **\$500K** to complete.
- Phase III – Need **\$1.3M** to complete.



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COMMUNICATION PLAN



- Will be developed and implemented very similar to the UMRS Hydraulic FRM Model Effort involving quarterly progress review webinars and formal review of key products.
- Communication for the UMR-Hydraulic Model status must reflect an open and transparent approach.
- It is USACE's intent to address questions, comments and concerns from the public, media and stakeholders ranging from non-governmental organizations to Congress. Comprehensive list of Q&As will be developed and shared.
- A "Touch Points" chart will be developed to show all of the different groups that will be communicated with during the FFS progression.
- Main body of Communication Plan will outline purpose, scope, schedule, budget, interested parties, products and possible applications.
- Appendices will provide comprehensive Key Talking Points, Frequently Asked Questions, Letters of Congressional Support/Inquiry and Letters of Stakeholder Support/Inquiry.



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QUESTIONS

