Scope Description: Develop updated HEC-RAS computation model to allow for wider use for floodplain management on the UMR system in support of flood risk management, real-time river forecasting, Corps Water Management System (CWMS), flood fighting operations, and 408 Levee Modification studies. The development of the UMR hydraulic model will be a collaborative effort by federal, state, and stakeholders facilitated by USACE. The HEC-RAS model will run unsteady flow hydrographs and will provide a base condition to evaluate proposed changes to the system. Study phases (below) may vary depending on funding. Estimated time-line: two to three years following receipt of funding.

Phase I – Mississippi River LD19 to Thebes, Illinois; (320 River Miles)
Illinois Waterway Lockport to Grafton, Illinois; (285 River Miles)
Phase II – Mississippi River LD10 to LD19 (250 River Miles)
Mississippi River Anoka to LD10 (250 River Miles)

Interagency Team: MN, WI, IA, IL, MO DNR's; FEMA; MVP, MVR, MVS, MVD; USGS

1) **Scope**
   a. Establish Team Structure (Proposed)
      Technical Team
      Technical Review Team
      Collaborative Team
   b. Develop scope of work
      i. Standard Operating Procedure (CWMS) for updating the model
      ii. Standard Operating Procedure (CWMS) for documentation within the model
   c. Initial meeting with interagency members /stakeholders to discuss the scope of work
      i. Modify/meet as needed until final scope is developed
      ii. Discuss the long term goals of the model
         1. "Repository" responsibility (USACE)
         2. Annual maintenance / model updates (CWMS/water control, emergency management)
      iii. Discuss potential outcomes and reactions and challenges
         Some potential challenges:
         1. Cross section rating curves may be different than 2004 UMRSFFS and subsequent FEMA mapping based upon 2004 UMRSFFS? Initial reaction and path forward?
         2. USACE H&H / Risk analysis for 408 modifications and overlap with the States' requirements.

2) **Development/Refinements/improvements to HEC-RAS model**
   a. Update model geometry w/ LIDAR and bathymetric data (best available data)
   b. Horizontal Projection = Albers Equal Area; Vertical Projection = NAVD88, feet (consistent with CWMS)
   c. Set criteria for using NLD (release of information) vs. authorized top of levee information (if available) to assign overtopping elevations (input both)
   d. Add storage areas (Develop of 2D mesh within storage areas at selected locations)
   e. Add dam structures
   f. Develop "reach" models / Use river mile cross-section locations consistent w/ UMRSFFS
   g. Add additional cross sections (if needed)
   h. Tributaries – reaches vs. lateral inflow, Evaluate by tributary size/extent, Available tributary models
   i. Add ungaged inflows, effort involves communicating with the hydrologic modelers so ultimately the HEC-RAS model works well with the hydrologic models
   j. Revisit bridges, piers, and embankments perpendicular to flow
   k. Develop calibration parameters, calibrate to specific historic events, calibrate to lower operational / forecast flows
   l. Compare to UMRSFFS profiles (cross section rating curves from both model results)
   m. Technical reviews (50% / 100%)
   n. Prepare model documentation reports + final model files