

RED RIVER BASIN COMMISSION

Fargo/Moorhead • Winnipeg



RRBC VISION

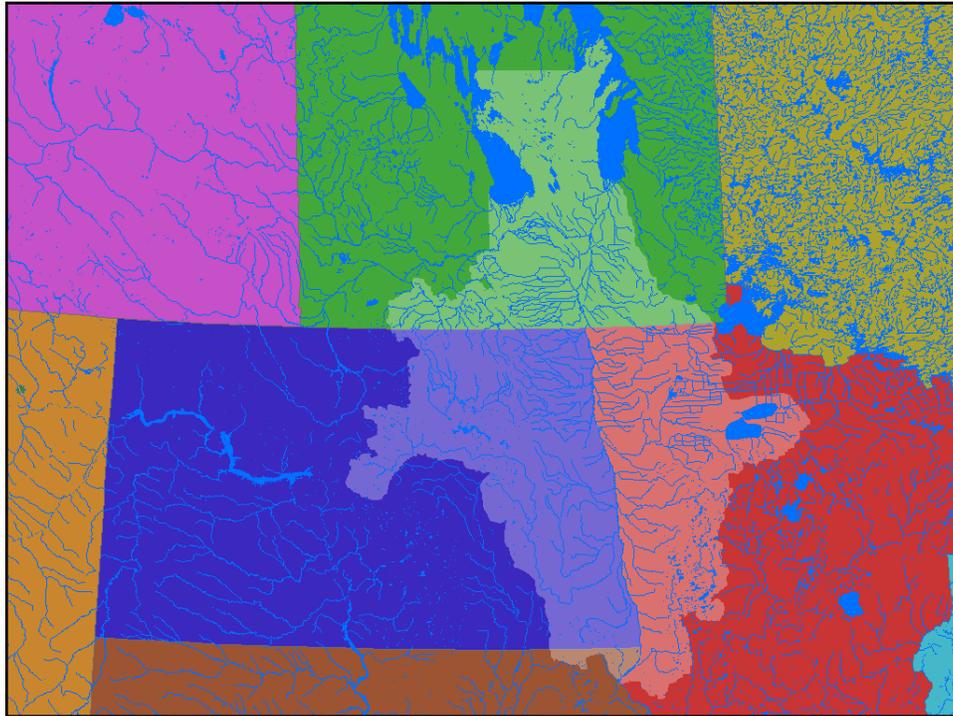
A Red River Basin where residents, organizations and government work together to achieve basin-wide commitment to comprehensive integrated watershed stewardship.

RRBC MISSION

To develop a Red River Basin integrated natural resources framework plan (vision); to achieve commitment to implement the framework plan; and to work toward a unified voice for the Red River Basin.

RRBC 2013-2015 Board of Directors

| | | |
|---|---|---|
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NATURAL RESOURCE FRAMEWORK PLAN (NRFP)

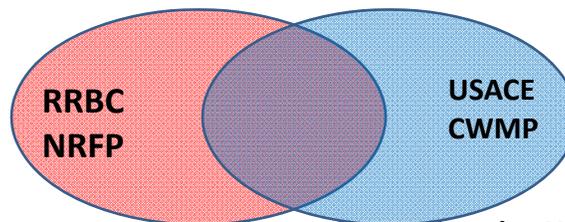
1. Watershed
2. Integration
3. Data/Technology
4. Education/Information
5. FDR: Forecasting
6. FDR: Mitigation
7. FDR: Response & Recovery
8. Drainage
9. Water Quality
10. Water Supply
11. Conservation
12. Fish & Wildlife
13. Outdoor Recreation



Comprehensive Watershed Management Plan (CWMP)

- The CWMP is a Corps document that will provide the vehicle for future Federal investment in the Red River Basin.
- The CWMP will reflect basin-wide NRFP goals and objectives.

Proposal: join efforts to update the Natural Resources Framework Plan and produce a Comprehensive Watershed Management Plan



Basin-wide shared vision and unified voice for action.

Comprehensive U.S. plan showing opportunities for federal, state, and local action.

**Proposal: simplify and combine
the existing NRFP goal areas into
six focus areas.**

| Current NRFP work Group | Proposed NRFP/CWMP Work Group |
|---------------------------|---------------------------------------|
| Flood Damage Reduction | Flood Risk Management and Hydrology |
| Fish and Wildlife | Aquatic and Riparian Ecosystem Health |
| Water Quality | Water Quality |
| Water Supply | Water Supply and Drought management |
| Recreation | Recreation |
| Conservation and Drainage | Conservation and Land Use |

Water Supply Goal

Ensure the appropriate use and sustainability of the Basin's surface and groundwater

- Develop a basin-wide strategy to meet current and projected water supply needs in the basin.
- Develop water supply emergency management plans for contamination, drought and flooding.
- Develop an understanding of the approaches and differences in minimum in-stream flow criteria to maintain and protect all users.

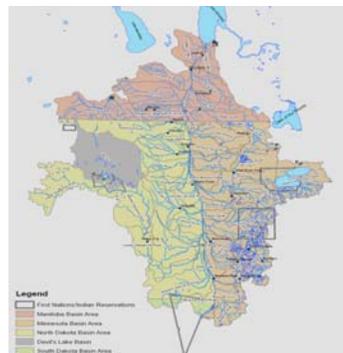
Red River Basin Commission's Drought Preparedness Strategy

Abul Kashem
MB Water Stewardship & RRBC Drought WG
Assistance: Lance Yohe, Ex. Dir. RRBC
Ottawa: October 18, 2008

RRBC: DROUGHT SCOPING DOCUMENT

STUDY SCOPE

- Examines existing water laws and regional drought approaches
- Outlines a process to develop basin-wide drought strategy



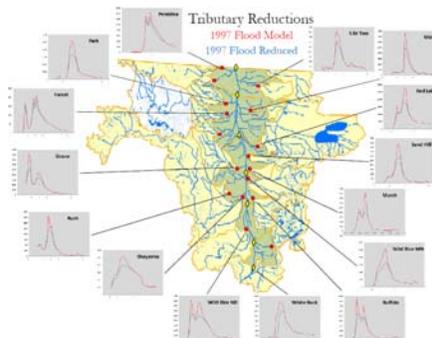
RRBC: DROUGHT SCOPING DOCUMENT WHAT IS NEEDED?

- A strategy plan is needed to address questions in order to:
 - Point out how each jurisdiction would operate under the given conditions.
 - Explore avenues for cooperation.
 - Define a process for this cooperation.
 - Develop a strategy for informing the public.
 - Explore other related topics that show what the basin entities can do.

Red River Basin Commission – Basinwide Flow Reduction Strategy

| 20% Reduction Model | | | | | | 1/20/2010 |
|---|---------------------|---------------------|------------------|------------------|--|---------------------|
| Summary of Tributary Flow Reductions | | | | | | cts |
| 1997 Spring Flood | | | | | | |
| | Peak Flow Reduction | Peak Flow Reduction | Volume Reduction | Volume Reduction | | Reduction Focus |
| | % | cts | % | acft | | |
| Gaged Tributaries | | | | | | |
| BdS R @ White Rock | 20% | 1542 | 20% | 61700 | | Store early water |
| Ottertail R @ Orwell | 0 | 0 | 0 | 0 | | No reduction |
| Wildrice ND @ Abercrombie | 35% | 2854 | 17% | 57900 | | Peak flow reduction |
| Sheneye R @ Harwood | 23% | 2401 | 11% | 66396 | | Peak flow reduction |
| Rush R @ Amenia | 35% | 508 | 13% | 4324 | | Peak flow reduction |
| Buffalo R @ Dilworth | 35% | 2930 | 17% | 38158 | | Peak flow reduction |
| Wild Rice MN @ Hendrum | 35% | 3610 | 20% | 74385 | | Peak flow reduction |
| Goose R @ Hillsboro | 35% | 2620 | 16% | 35356 | | Peak flow reduction |
| Marsh R nr Shelby | 51% | 2100 | 18% | 15247 | | Peak flow reduction |
| Sand Hill R @ Climax | 35% | 1510 | 21% | 22161 | | Peak flow reduction |
| Red Lake R @ Crookston | 35% | 9600 | 13% | 119297 | | Peak flow reduction |
| Turtle R nr Arvilla | 10% | 90 | 13% | 4615 | | Store late water |
| Forest R @ Minto | 14% | 300 | 7% | 5875 | | Store late water |
| Middle R @ Argyle | 35% | 1330 | 23% | 15067 | | Store late water |
| Park R @ Grafton | 35% | 1800 | 20% | 26452 | | Peak flow reduction |
| S Br Two R @ Lake Bronson | 27% | 1100 | 14% | 15200 | | Store late water |
| Tongue R @ Akra | 7% | 50 | 4% | 1580 | | Store late water |
| Pembina R @ Neche | 13% | 1900 | 9% | 51113 | | Peak flow reduction |
| Average/Total | 22% | | 13% | 696709 | | |
| Ungaged Areas | | | | | | |
| Rabbit R @ TH 75 ung | 35% | 2108 | 26% | 24377 | | Peak flow reduction |
| BdS ungaged | 13% | 1135 | 9% | 12119 | | Peak flow reduction |
| Ottertail ung | 13% | 500 | 12% | 7217 | | Peak flow reduction |
| Fargo ungaged | 13% | 3000 | 13% | 30433 | | Store late water |
| Halsied ung | 13% | 7500 | 13% | 81002 | | Store late water |
| RLR ung | 12% | 1600 | 10% | 11427 | | Store late water |
| GF ungaged | 12% | 4400 | 10% | 32015 | | Store late water |
| Snake R ung | 16% | 1367 | 15% | 17128 | | Store late water |
| Tamarac R ung | 13% | 563 | 12% | 7179 | | Store late water |
| Drayton ung | 8% | 1370 | 10% | 22208 | | Store late water |
| Emerson ung | 7% | 3000 | 7% | 23364 | | Store late water |
| Average/Total | 14% | | 12% | 268468 | | |
| Total volume of flow reduction on the tributaries 885177 acre-feet | | | | | | |
| 13% of total volume | | | | | | |

- Part of Long Term Flood Solutions Report
- Reduce Red River main-stem flows by 20%
- Based on 1997 Spring Flood Event
- Applied to HEC-HMS Synthetic Hydrology



Halstad Upstream Retention Study Scope

- To provide information to advance the Red River Basin Commission's Long Term Flood Solutions Report
- To provide assistance to the Fargo-Moorhead Diversion Authority on how to prioritize/allocate the approved \$25 Million in Detention Funding
- **NOT to determine how upstream detention would alter current Fargo-Moorhead Metro Diversion Design**

Halstad Upstream Retention Study Background

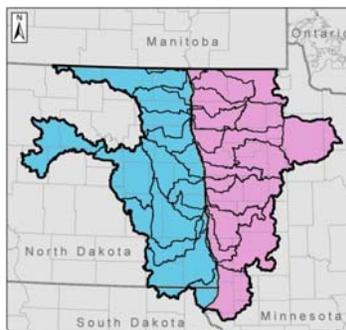
RRBC HUR Study Tasks – Combined Red River of the North Impacts

- Develop Standardized Basin HMS/RAS Evaluation Model
- Model Provided Sites for LTFS Goals
 - ***Project Goal: 20% reduction on a scenario resulting in the 100-year flood along the Red River***
- Red River Mainstem Impacts
- Funding/Prioritization Policy Assistance

Detention Site Examples – On-Channel and Off-Channel Options



Red River Basin Tributary Detention Planning Efforts



ND Comprehensive Detention Plans

- Large Scale Sites
- Identification of all apparent sites
- WRD Involvement
- Multiple proposed conditions scenarios
- Multiple Runoff Events
- Establish benefit within Tributaries
- Establish reduction to Red River main stem
- Detailed reporting

MN Expanded Distributed Detention Strategy

- Large Scale Sites
- Identification of sites required to meet LTFS goals
- Limited WD Involvement
- One proposed condition
- Standard melt progression event only
- Establish benefit within Tributaries
- Establish reduction to Red River main stem
- Generalized reporting

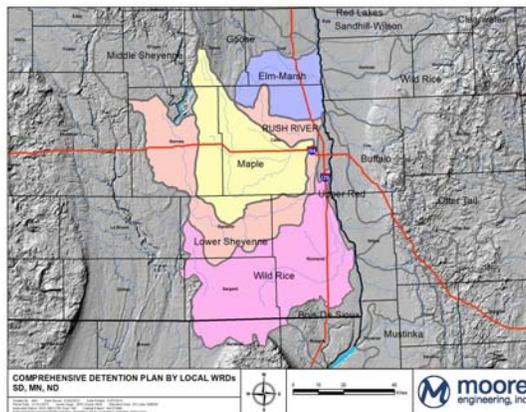
ND Comprehensive Detention Plan

Methodology –

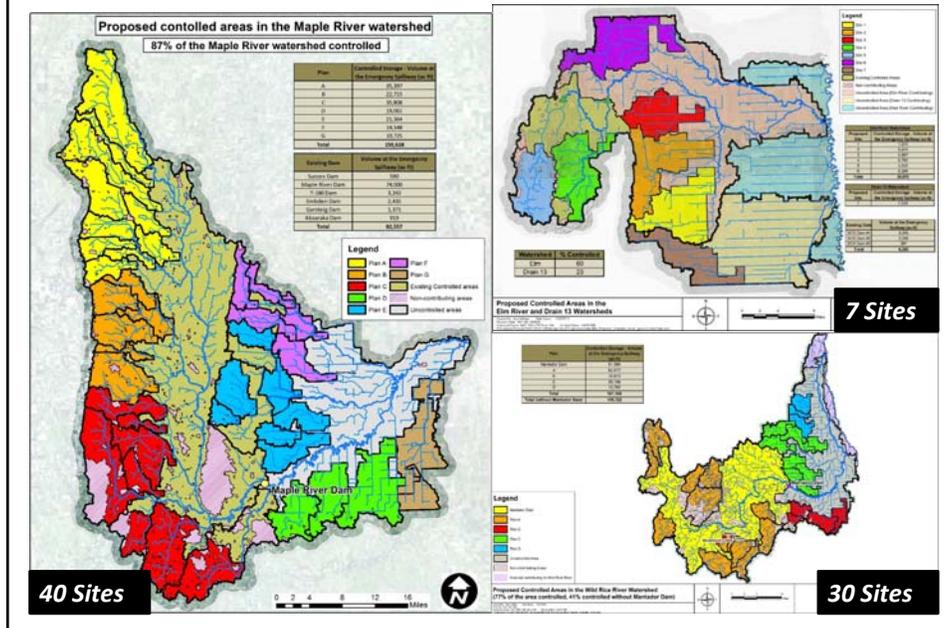
- **Site Identification Criteria**
 - Control minimum of 20 square miles
 - Avoid impacts to residential structures / infrastructure
 - Store a minimum of 3 inches of runoff
 - Avoid mainstem locations in lower 2/3 of watershed
 - Primarily select off-channel & stream locations
 - Reasonable levee heights & inundation impacts
- **Modeling Assumptions**
 - Gated with E.S. 5 feet below top of levee
 - Dry storage, no conservation pools

ND Comprehensive Detention Plan – *Upstream Watersheds*

- **Elm River**
 - Trail Co. WRD
 - Cass Co. Joint WRD
- **Rush River**
 - Cass Co. Joint WRD
- **Maple River**
 - Maple River WRD
- **Lower Sheyenne**
 - Cass Co. Joint WRD
- **Wild Rice River**
 - Richland Co. WRD
 - Cass Co. Joint WRD



ND Comprehensive Detention Plan – Upstream Watersheds



ND Comprehensive Detention Plan – Upstream Watersheds

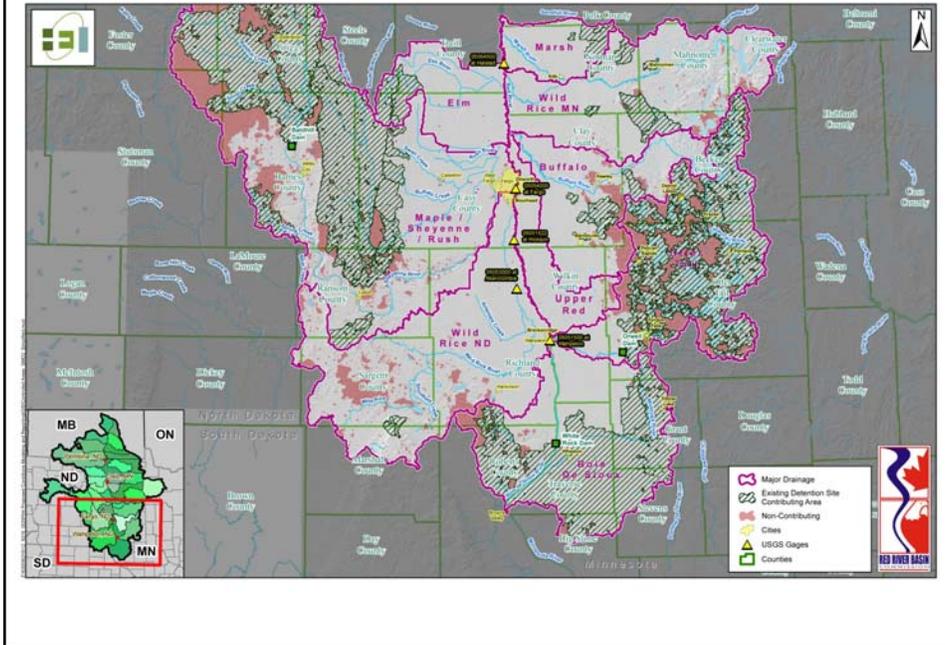
100 ND Detention Site Options Identified

- 7 Elm River
- 3 Rush River
- 40 Maple River
- 20 Lower Sheyenne
- 30 Wild Rice

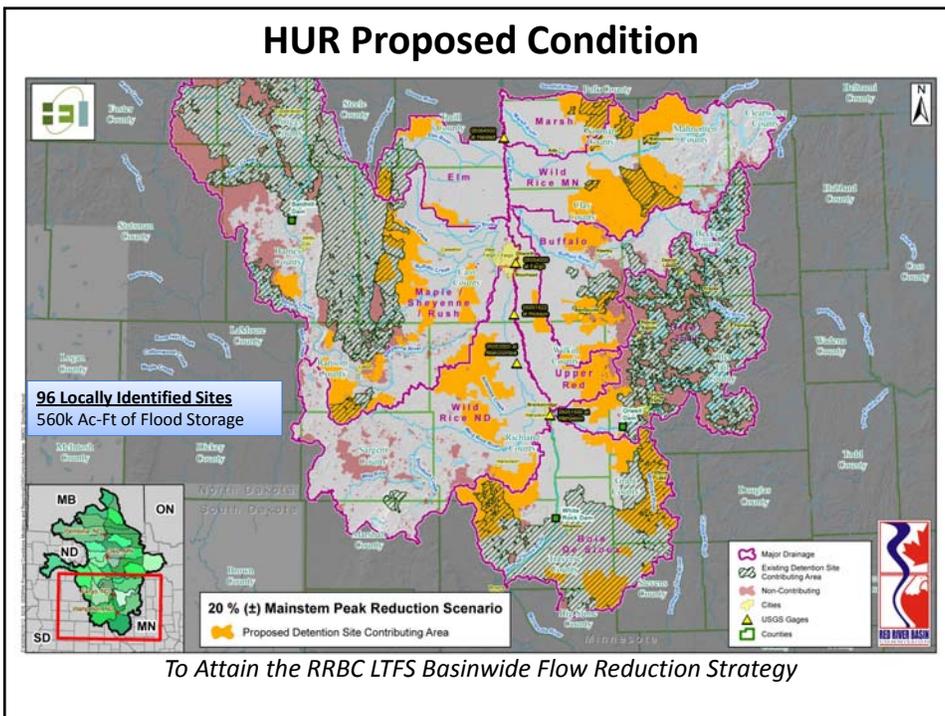
Summary of Results for 100-yr Snowmelt

- Tributary peak reductions in excess of 35% possible
- Flood volume reductions in excess of 20% possible
- LTFS tributary goals can be achieved
- Off-channel sites needed to control peaks in many cases

Existing Conditions



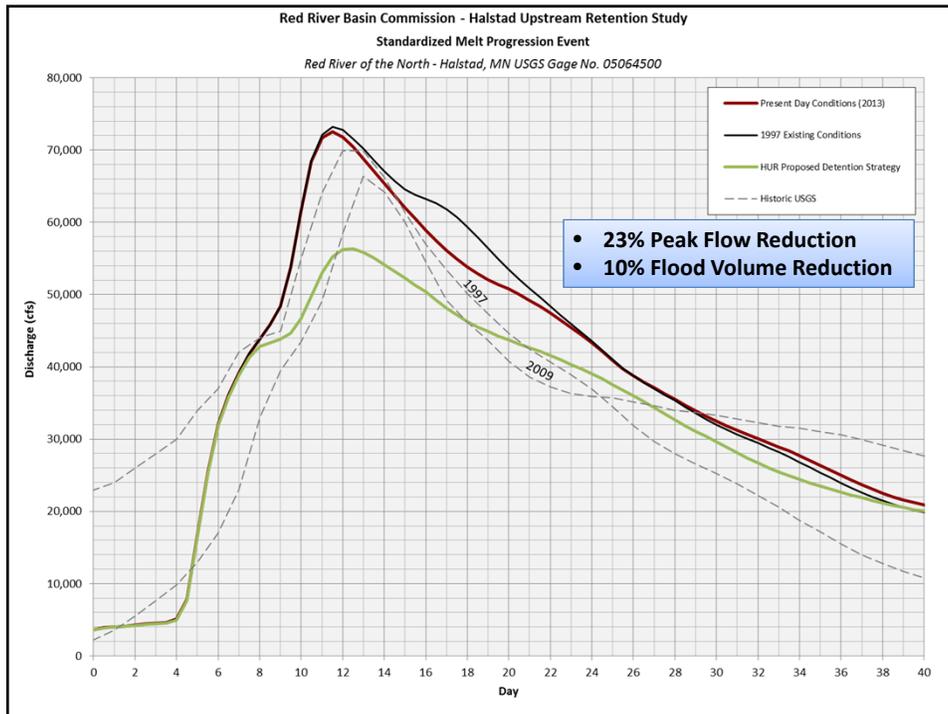
HUR Proposed Condition

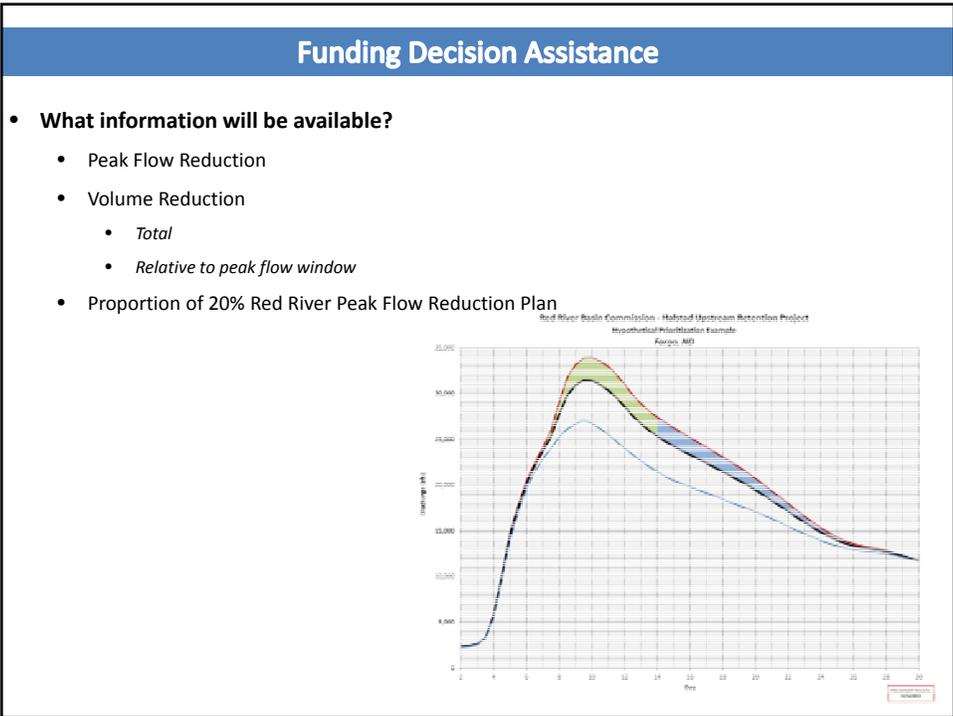
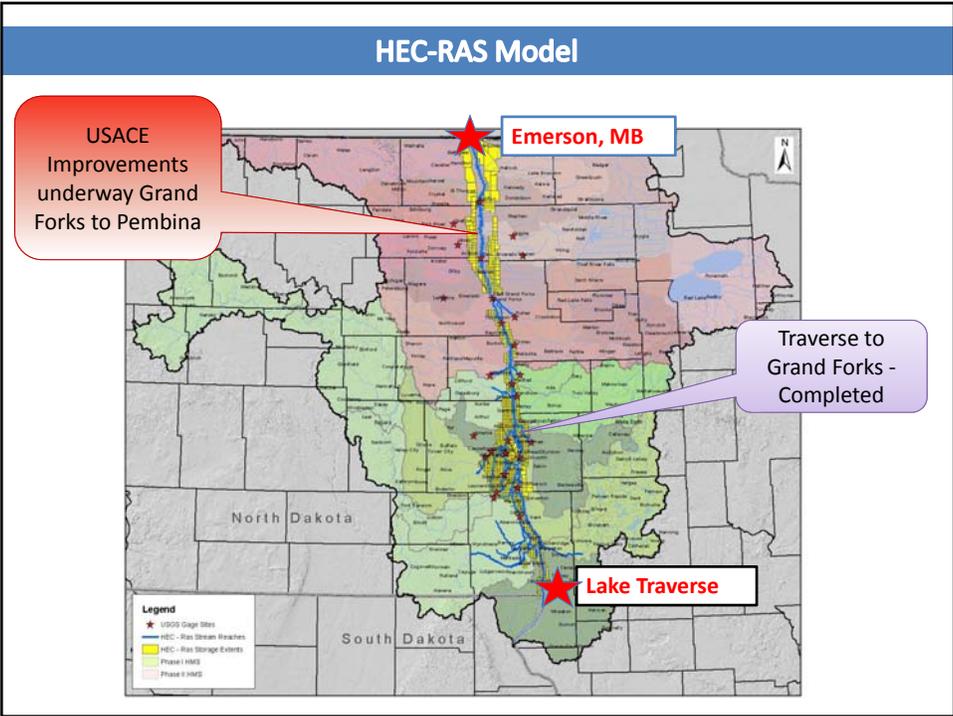


**One Scenario Resulting in a 20% Peak Flow Reduction
96 Locally Identified Sites**

| Watershed | Contributing Area | Contributing Area of Proposed Sites | Number of Sites Included | Total Utilized Storage* | Gated Storage* | Utilized Ungated Storage* | Event Peak Inundation Area |
|-------------------------|-------------------|-------------------------------------|--------------------------|-------------------------|----------------|---------------------------|----------------------------|
| | Square Miles | Square Miles | | Acre-Feet | Acre-Feet | Acre-Feet | |
| Bois De Sioux | 1,850 | 589 | 22 | 106,200 | 88,100 | 18,100 | 20,130 |
| Otter Tail | 1,380 | 44 | 1 | 6,400 | 2,500 | 3,900 | 1,530 |
| Upper Red River | 486 | 159 | 4 | 37,800 | 29,300 | 8,500 | 9,340 |
| Wild Rice (ND) | 2,022 | 345 | 13 | 75,600 | 64,700 | 10,900 | 17,870 |
| Maple/Rush/Sheyenne | 5,397 | 506 | 26 | 120,500 | 98,800 | 21,700 | 20,050 |
| Buffalo | 995 | 198 | 6 | 37,000 | 25,400 | 11,600 | 11,140 |
| Elm (Red River Ungaged) | 478 (255) | 109 | 3 | 23,900 | 18,900 | 5,000 | 4,780 |
| Wild Rice (MN) | 1,616 | 589 | 17 | 123,700 | 101,000 | 22,700 | 18,340 |
| Marsh | 398 | 115 | 4 | 28,200 | 26,800 | 1,400 | 4,590 |
| Totals | 14,622 | 2,654 | 96 | 559,300 | 455,500 | 103,800 | 107,770 |

*Presented storage volumes correlate to runoff volume detained during the analyzed 4-day Initial Melt Progression Event.

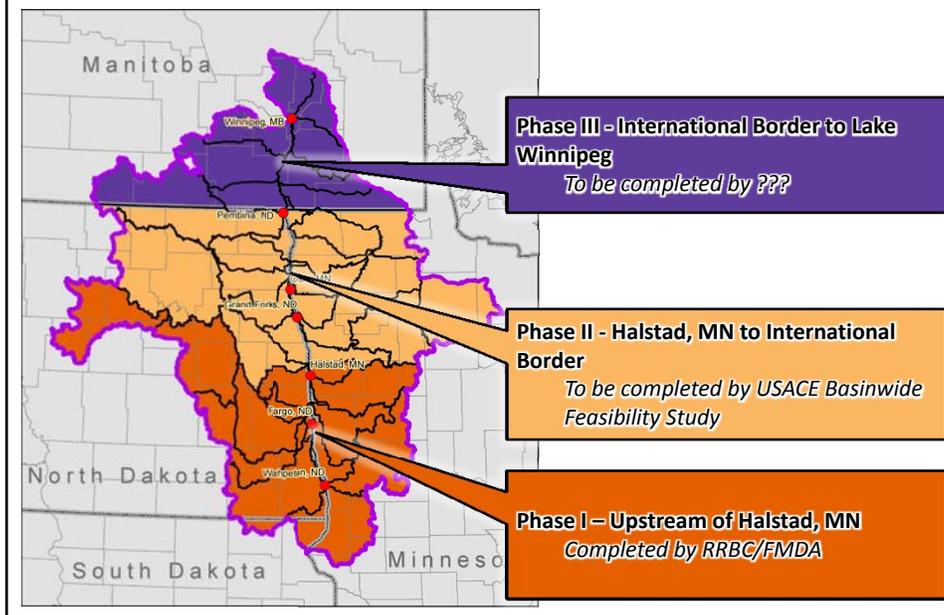




Implementation Hurdles

- **Funding Availability**
 - Magnitude of funds need to fully implement
 - Funding eligibility (Project Development, Land Acquisition, etc...)
 - Non-traditional funding partners (FM Diversion Authority, Farm Bill, etc...)
- **Land Acquisition Methods – Site Specific Location**
 - Education
 - Proactive Acquisition
 - Condemnation
- **Locally Acceptable vs Permit-ability**
 - Location, location, location...

Basinwide Strategy... Next Steps



Other RRBC Initiatives

- **Water Quality**

- Nutrient Reduction Strategies of ND, MN and MB
- Nutrient Capture at Off-channel Retention Sites/Cattail Harvesting

- **Aquatic Invasive Species**

- Education
- Watershed /Basin Approach

Questions contact: Jeff Lewis, Executive Director RRBC
jeff@redriverbasincommission.org