FINDING LONG TERM FLOOD SOLUTIONS TOGETHER

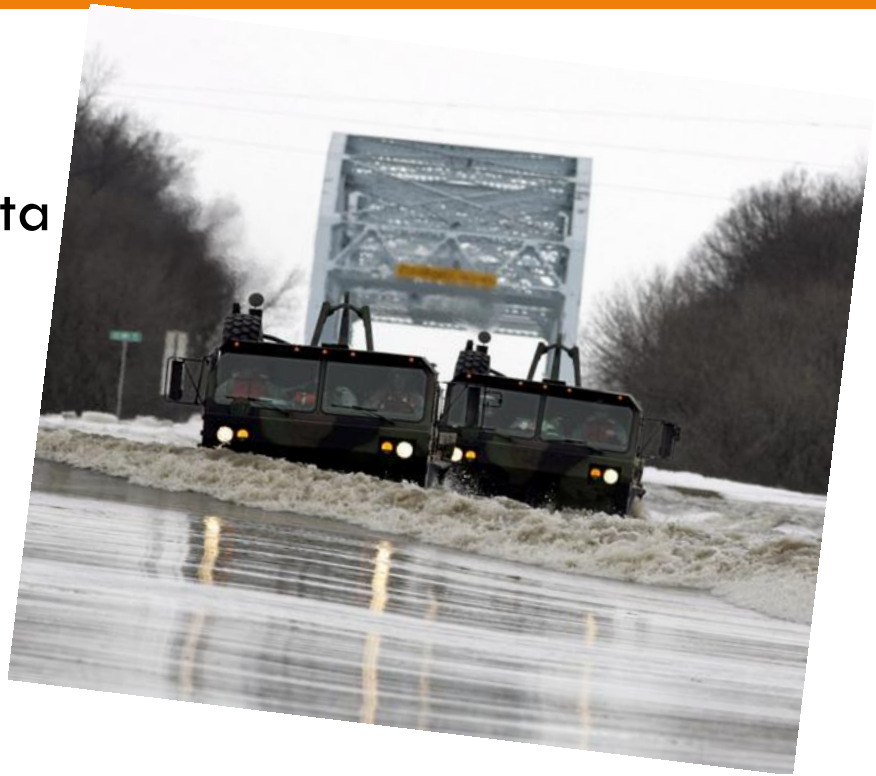
FOR THE RED RIVER BASIN OF THE NORTH

RED RIVER BASIN COMMISSION

RED RIVER BASIN COMMISSION 2009-2011

Impetus for LTFS Project

- Spring 2009 basin wide flood
- State legislative charge North Dakota & Minnesota
- "Comprehensive plan of action" to address, mitigate, and respond to flooding and related water quality and land conservation issues
- Funding and report
  - $500,000 each – ND & MN



LTFS Report Process

- RRBC Board of Directors
  - Oversight Committee
  - Advisory Committee
    - Technical Subcommittee
    - Policy Subcommittee
    - Economic Subcommittee
    - Impediments Subcommittee
- The public: flood forums, surveys

Assumptions

- **Agriculture** will continue to be the dominant land use throughout the basin. Adequate surface drainage has been and will continue to be integral to maintaining productivity of cropland. Sub-surface drainage is likely to become increasingly popular.
- **Current development and infrastructure** trends will continue into the foreseeable future. The major urban centers and communities will continue in their present locations. The major metropolitan areas will continue to grow. Future development will occur in compliance with floodplain management regulations.
- **Floods** will continue into the future. Floods larger than historically experienced can be expected to occur.
- **Flood damage reduction** will need to be implemented in the basin based primarily on the identified needs of the basin residents and their willingness to provide or seek the funding necessary to implement the measures which they believe are appropriate, effective, and justified. State and federal agencies will facilitate the implementation of the various measures based on their policies, regulations and availability of funding.
- Flood damage reduction is just one issue that affects the sustainability of the region. **Other key resource issues need to be considered** as this plan is developed and implemented, including droughts, water supply, water quality, and other natural resource areas.

Level of Protection Goals

Level of Flood Protection Goals for the Red River Basin

Area Protected	Estimated Recurrence Interval
Major urban/metropolitan areas (1) (2) (4)	500 year or greater
Critical infrastructure (1) (2)	500 year or greater
Cities/municipalities (1) (2)	200 year or greater
Rural residences & farmsteads (1) (2)	100 year or greater
Agricultural cropland: Summer flood	10 year or greater
Transportation (2) (3) Critical transportation system and emergency service links	200 year or greater

Notes

(1) Protection for urban areas, critical infrastructure, cities, rural residences, and farmsteads should all have appropriate freeboard (i.e., contingency or risk and uncertainty allowance) with any projects designed to provide the specified level of protection.

(2) If a flood of record has occurred which exceeds the specified level of protection goal, the flood of record should be used in place of the specified level of protection goal.

(3) The critical transportation systems should be maintained passable during a flood of the described level of protection to assure safe and reliable transportation and provision of emergency services. The transportation system should not increase flooding problems either upstream or downstream.

(4) Includes Fargo-Moorhead, Grand Forks-East Grand Forks, and Winnipeg.

Level of Protection Goals

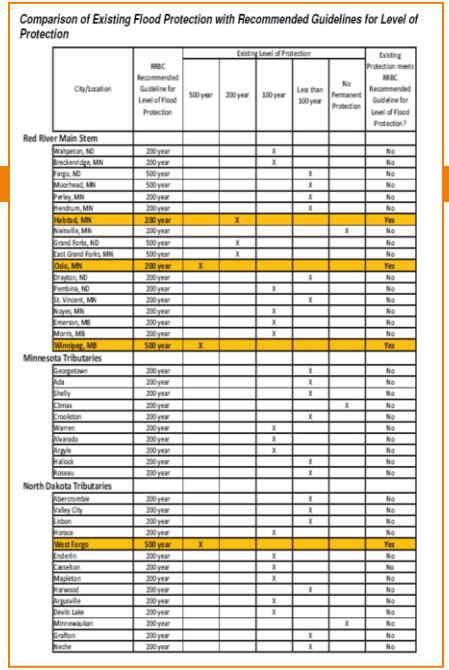
Comparison of Existing Flood Protection with Recommended Guidelines for Level of Protection for all cities on Red & Tribs.

The following cities meet the recommended guidelines for Levels of Protection:

Halstad, MN – 200 year
Oslo, MN – 200 year
Winnipeg, MB – 500 year
West Fargo, ND – 500 year

Communities with less than 100 year protection:

Fargo, ND
Moorhead, ND
Perley, ND
Hendrum, MN
Drayton, ND
St. Vincent, MN
Georgetown, MN
Ada, MN
Shelly, MN
Crookston, MN
Hallock, MN
Roseau, MN
Abercrombie, ND
Valley City, ND
Lisbon, ND
Harwood, ND
Grafton, ND
Neche, ND



Comparison of Existing Flood Protection with Recommended Guidelines for Level of Protection

City/Location	RRBC Recommended Guideline for Level of Flood Protection	Existing Level of Protection					Existing Protection meets RRBC Recommended Guideline for Level of Flood Protection?
		500 year	200 year	100 year	Less than 100 year	No Permanent Protection	
Red River Main Stem							
Wahpeton, ND	200 year			X			No
Breckenridge, MN	200 year			X			No
Fargo, ND	500 year				X		No
Moorhead, MN	500 year				X		No
Perley, MN	200 year				X		No
Hendrum, MN	200 year				X		No
Halstad, MN	**200 year**		**X**				**Yes**
Nielsville, MN	200 year					X	No
Grand Forks, ND	500 year		X				No
East Grand Forks, MN	500 year		X				No
Oslo, MN	**200 year**	**X**					**Yes**
Drayton, ND	200 year				X		No
Pembina, ND	200 year			X			No
St. Vincent, MN	200 year				X		No
Noyes, MN	200 year			X			No
Emerson, MB	200 year			X			No
Morris, MB	200 year			X			No
Winnipeg, MB	**500 year**	**X**					**Yes**
Minnesota Tributaries							
Georgetown	200 year				X		No
Ada	200 year				X		No
Shelly	200 year				X		No
Climax	200 year					X	No
Crookston	200 year				X		No
Warren	200 year			X			No
Alvarado	200 year			X			No
Argyle	200 year			X			No
Hallock	200 year				X		No
Roseau	200 year				X		No
North Dakota Tributaries							
Abercrombie	200 year				X		No
Valley City	200 year				X		No
Lisbon	200 year				X		No
Horace	200 year			X			No
West Fargo	**500 year**	**X**					**Yes**
Enderlin	200 year			X			No
Casselton	200 year			X			No
Mapleton	200 year			X			No
Harwood	200 year				X		No
Arguseille	200 year			X			No
Devils Lake	200 year			X			No
Minnewaukan	200 year					X	No
Grafton	200 year				X		No
Neche	200 year				X		No

REPORT

End product/deliverables:

- Two reports:
  - Comprehensive
  - Legislative
- Recommendations to policy makers
- Tools for water managers, local governments, state & federal agencies

REPORT

Part 1 Background

Chapter 1: Crisis of Red River Basin Flooding

Chapter 2: Past Responses & Challenges

Chapter 3: Long Term Flood Solutions Study

REPORT

Part 2 Carrying Out the Charge

Chapter 4: Costs of Basin Flooding

Chapter 5: Building Foundations

Chapter 6: Long Term Flood Solutions Study

REPORT

Part 3 Long-Term Strategies for Flood Protection

Chapter 7: Floodplain Management

Chapter 8: Local Flood Protection

Chapter 9: Flow Reduction

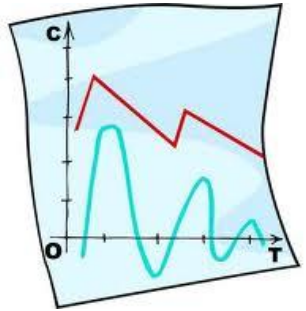
Recommendations

DATA-Technical Appendices

Identifying the unknown

- Maps
- Peak flow data
- Updated runoff models
- Difference in flood levels
- Economic/flood damage data

- Existing storage in the basin
- Effects of planned upstream storage
- Levels of protection
- Current or pending flood projects
- 20% flow reduction
- Community unmet needs



Mainstem Flow Reductions

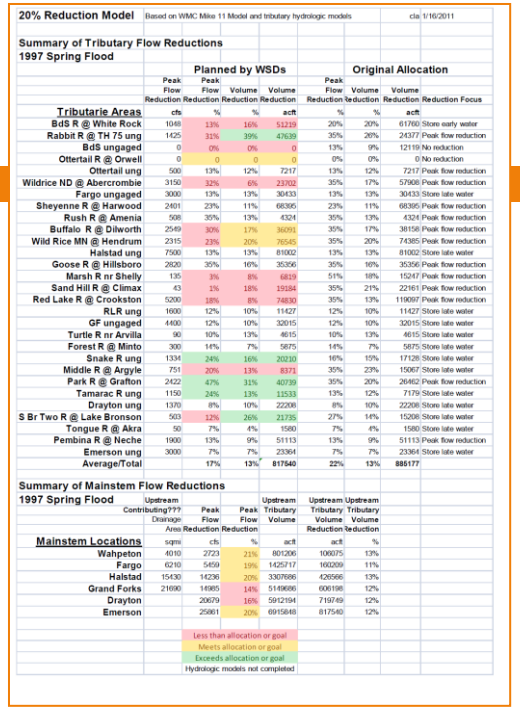
20% Flow Reductions for the Red River Basin at the International Boundary

Are there enough locations to achieve this?

Based on the modeling from the specific tributary areas:
Total Volume Reduction: 885,177 acre feet

Effects of flow reductions at mainstem locations (peak flow reduction %):

Wahpeton	21%
Fargo	19%
Halstad	20%
Grand Forks	14%
Drayton	16%
Emerson	20%



20% Reduction Model — Based on WMC Mike 11 Model and tributary hydrologic models — cla 1/16/2011

Summary of Tributary Flow Reductions
1997 Spring Flood

	Planned by WSDs				Original Allocation			
	Peak Flow Reduction	Peak Flow Reduction	Volume Reduction	Volume Reduction	Peak Flow Reduction	Volume Reduction	Volume Reduction	Reduction Focus
Tributarie Areas	cfs	%	%	acft	%	%	acft	
BdS R @ White Rock	1049	13%	16%	51219	20%	20%	61760	Store early water
Rabbit R @ TH 75 ung	1425	31%	39%	47639	35%	26%	24377	Peak flow reduction
BdS ungaged	0	0%	0%	0	13%	9%	12119	No reduction
Ottertail R @ Orwell	0	0	0	0	0%	0%	0	No reduction
Ottertail ung	500	13%	12%	7217	13%	12%	7217	Peak flow reduction
Wildrice ND @ Abercrombie	3150	32%	6%	23702	35%	17%	57908	Peak flow reduction
Fargo ungaged	3000	13%	13%	30433	13%	13%	30433	Store late water
Sheyenne R @ Harwood	2401	23%	11%	66366	23%	11%	66365	Peak flow reduction
Rush R @ Amenia	508	35%	13%	4324	35%	13%	4324	Peak flow reduction
Buffalo R @ Dilworth	2549	30%	17%	36091	35%	17%	38158	Peak flow reduction
Wild Rice MN @ Hendrum	2315	23%	20%	76545	35%	20%	74385	Peak flow reduction
Halstad ung	7500	13%	13%	81002	13%	13%	81002	Store late water
Goose R @ Hillsboro	2626	35%	16%	35356	35%	16%	35356	Peak flow reduction
Marsh R nr Shelly	135	3%	8%	6819	51%	18%	15247	Peak flow reduction
Sand Hill R @ Climax	43	1%	18%	19184	35%	21%	22161	Peak flow reduction
Red Lake R @ Crookston	5200	18%	8%	74830	35%	13%	110097	Peak flow reduction
RLR ung	1600	12%	10%	11427	12%	10%	11427	Store late water
GF ungaged	4400	12%	10%	32015	12%	10%	32015	Store late water
Turtle R nr Arvilla	90	10%	13%	4615	10%	13%	4615	Store late water
Forest R @ Minto	300	14%	7%	5675	14%	7%	5675	Store late water
Snake R ung	1334	24%	16%	20210	16%	15%	17128	Store late water
Middle R @ Argyle	751	20%	13%	8371	35%	23%	15067	Store late water
Park R @ Grafton	2422	47%	31%	40739	35%	20%	26462	Peak flow reduction
Tamarac R ung	1150	24%	13%	11533	13%	12%	7179	Store late water
Drayton ung	1370	8%	10%	22208	8%	10%	22208	Store late water
S Br Two R @ Lake Bronson	503	12%	26%	21735	27%	14%	15208	Store late water
Tongue R @ Akra	50	7%	4%	1580	7%	4%	1580	Store late water
Pembina R @ Neche	1900	13%	9%	51113	13%	9%	51113	Peak flow reduction
Emerson ung	3000	7%	7%	23364	7%	7%	23364	Store late water
Average/Total		17%	13%	817540	22%	13%	885177	

Summary of Mainstem Flow Reductions
1997 Spring Flood

	Upstream Contributing??? Drainage Area	Peak Flow Reduction	Peak Flow Reduction	Upstream Tributary Volume Reduction	Upstream Tributary Volume Reduction	Upstream Tributary Volume Reduction
Mainstem Locations	sqmi	cfs	%	acft	acft	%
Wahpeton	4010	2723	21%	801206	106875	13%
Fargo	6210	5459	19%	1425717	160209	11%
Halstad	15430	14236	20%	3307686	426566	13%
Grand Forks	21690	14985	14%	5149686	606198	12%
Drayton		20679	16%	5912194	719749	12%
Emerson		25961	20%	6915848	817540	12%

Less than allocation or goal
Meets allocation or goal
Exceeds allocation or goal
Hydrologic models not completed

Bois de Sioux Flow Reductions

20% Flow Reductions for the Bois de Sioux Watershed.

Identifies total acre/ft needed to achieve 20% flow reductions.

Total Acre/Ft of Storage in the Bois de Sioux Watershed District:
Gated Storage: 100,753 (ac ft)
Ungated Storage: 24,062 (ac ft)
Total Storage: 124,815 (ac ft)

Needed to meet 20% flow reduction goal: 98,256

Impoundment sites included in Flow Reduction Strategy
Bois de Sioux Watershed District
4/19/2009

	Gated Storage (ac-ft)	Un-Gated Storage (ac-ft)	Total Storage (ac-ft)	RRBC 20% plan Reduction (ac-ft)
White Rock watershed				
Red Path	13100	3100	16200	
Red Path West	5501	545	6046	
Eldorodo 7	1700	755	2455	
Big	463	1325	1788	
	2723	686	3409	
Moonshine 13	1520	328	1848	
Moonshine 4	885	322	1207	
Leonardsville 31E	1046	413	1459	
Dollymount 30	5484	872	6356	
Leonardsville 31W	1592	350	1942	
12	3071	843	3914	
Leonardsville 12	6630	1031	7661	
Croke 17	2142	605	2747	
Dollymount 24	1499	552	2051	
Walls 36	1897	850	2747	
Moose Head	1622	896	2518	
Walls 30	3831	937	4768	
17	1695	518	2213	
	1965	890	2855	
Township	3802	950	4752	
Subtotal	**62168**	**16768**	**78936**	**61760**
Rabbit watershed				
	16160	2050	18210	
Brandrup S23	3020	980	4000	
S34	3042	627	3669	
S19	5892	1061	6953	
Tintah S34	833	160	993	
Daniels	867	223	1090	
Subtotal	**29814**	**5101**	**34915**	**24377**
Bois de Sioux Ungaged				
Subtotal	0	0	0	**12119**
Total BdSWD	**91982**	**21869**	**113851**	**98256**

Subwatershed Retention

How can retention change our floods?

Reduction in flows

20 percent

Approximate Peak Stage Reduction of Proposed Storage from the 1997 flood 6 Points on the Mainstem:

1. Wahpeton/Breckenridge 21%
2. Fargo/Moorhead 19%
3. Halstad 20%
4. Grand Forks/East Grand Forks 17%
5. Drayton 20%
6. Emerson 24%

Effects of Proposed Flood Storage on 1997 Flood on the Red River Main Stem and Tributaries

Upstream/Tributary Drainage Areas	Total Volume of 1997 Flood (Mike 11 Model)	Peak Flow of 1997 Flood (Mike 11 Model)	Proposed Storage in Watershed	Modified Peak Flow with Proposed Storage	Peak Flow Reduction of Proposed Storage	Peak Flow Reduction of Proposed Storage	Approx. Peak Stage Reduction of Proposed Storage
	ac-ft	cfs	ac-ft	cfs	cfs	%	ft
Bois de Sioux @ White Rock Dam		7,820	78,900	6,780	1,050	13%	
Rabbit River @ TH 75 ungaged		4,570	34,900	3,140	1,430	31%	
Bois de Sioux ungaged		8,540	*0*	8,540	0	0%	
Otter Tail River @ Orwell Dam		1,500	*0*	1,500	0	0%	
Otter Tail River ungaged		3,800	*11,000*	3,300	500	13%	
Wahpeton/Breckridge	**742,000**	**12,890**	**124,800**	**10,170**	**2,720**	**21%**	**2.4**
Wild Rice River @ Abercrombie		9,930	75,500	6,780	3,150	32%	
Fargo ungaged		23,000	*42,000*	20,000	3,000	13%	
Fargo/Moorhead	**1,450,000**	**28,570**	**242,300**	**23,110**	**5,460**	**19%**	**2.3**
Sheyenne River @ Harwood		10,300	*120,000*	7,900	2,400	23%	
Rush River @ Amenia		1,450	14,900	940	510	35%	
Buffalo River @ Dilworth		8,370	63,000	5,820	2,550	30%	
Wild Rice River @ Hendrum		10,150	*118,000*	7,840	2,310	23%	
Halstad Ungaged (includes Elm River)		57,000	*142,000*	49,500	7,500	13%	
Halstad	**3,310,000**	**71,390**	**700,200**	**57,160**	**14,200**	**20%**	**1.7**
Goose River @ Hillsboro		8,060	*62,000*	5,240	2,820	35%	
Marsh River near Shelly		4,070	*0*	3,930	140	3%	
Sand Hill River @ Climax		4,370	*39,000*	4,320	50	1%	
Red Lake River @ Crookston		28,980	270,000	23,780	9,400	32%	
Red Lake River ungaged		13,600	*20,000*	12,000	1,600	12%	
Grand Forks ungaged		36,400	56,000	32,000	4,400	12%	
Grand Forks/East Grand Forks	**5,130,000**	**110,750**	**1,147,200**	**95,770**	**19,000**	**17%**	**2.8**
Turtle River near Arvilla		930	11,500	840	90	10%	
Forest River @ Minto		2,100	*10,000*	1,800	300	14%	
Snake River ungaged		5,510	*30,000*	4,180	1,330	24%	
Middle River @ Argyle		3,710	*26,000*	2,960	750	20%	
Park River @ Grafton		5,110	50,300	2,690	2,420	47%	
Tamarac River ungaged		4,820	*13,000*	3,670	1,150	24%	
Drayton ungaged		17,170	39,000	15,800	1,370	8%	
Drayton	**5,820,000**	**128,320**	**1,327,000**	**107,640**	**26,000**	**20%**	**1.7**
South Branch Two Rivers @ Lake Bronson		4,060	*27,000*	3,560	500	12%	
Tongue River @ Akra		680	*3,000*	630	50	7%	
Pembina River @ Neche		14,300	*90,000*	12,400	1,900	13%	
Emerson ungaged		42,000	*41,000*	39,000	3,000	7%	
Emerson	**6,740,000**	**129,800**	**1,488,000**	**103,940**	**31,000**	**24%**	**1.3**

Indicates that Flow Reduction Goals were exceeded

Indicates that Flow Reduction Goals were met

Indicates that Flow Reduction Goals were not met

Levels of Protection

Based on the RRBC Recommended Levels of Protection, how do selected cities along the Red River stack up?

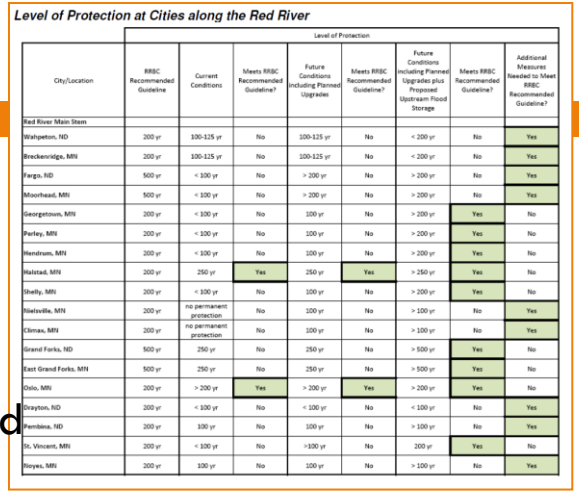
ON RED RIVER

First Green: Meet RRBC Recommended Guidelines Under Current Conditions. (Halstad/Oslo)

Second Green: Meet RRBC Recommended Guidelines with Current Planned Upgrades. (Same)

Third Green: Meet RRBC Recommended Guidelines with Current Planned Upgrades & Upstream Storage (20%). (9)

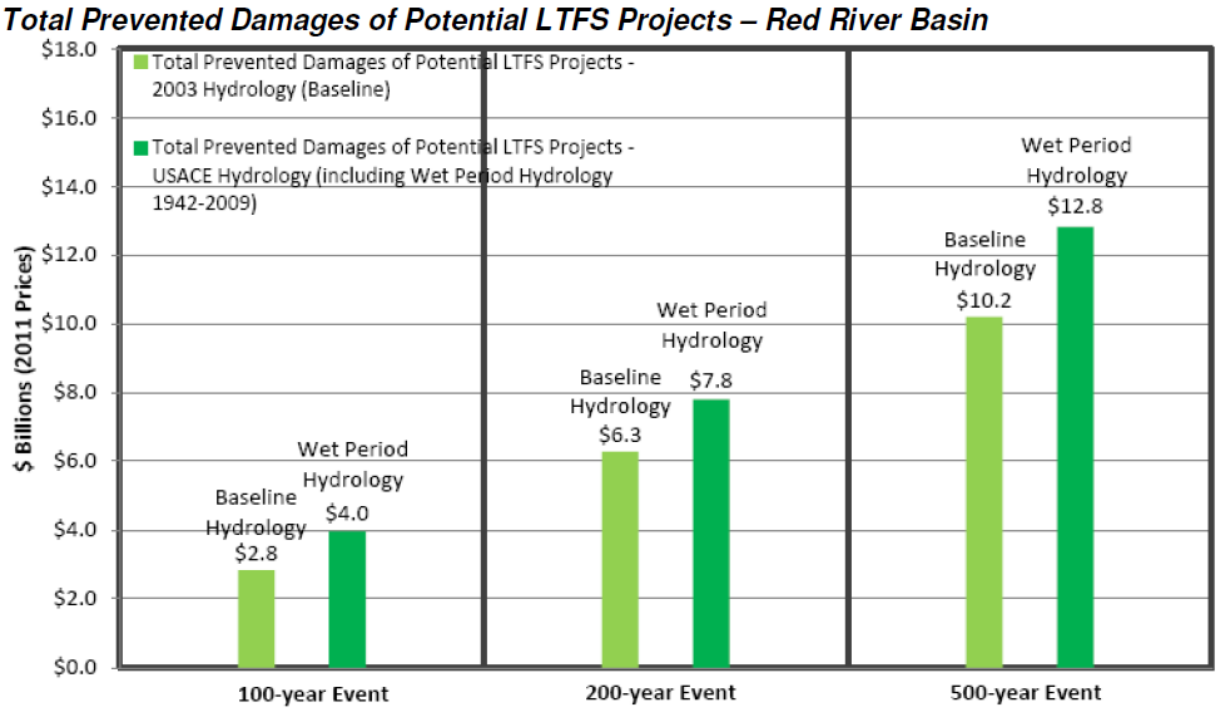
Fourth Green: 9 still need additional measures (W-B, F-M, Nielsville, Climax, Drayton, Pembina, Noyes)



Level of Protection at Cities along the Red River

City/Location	Level of Protection							
	RRBC Recommended Guideline	Current Conditions	Meets RRBC Recommended Guideline?	Future Conditions including Planned Upgrades	Meets RRBC Recommended Guideline?	Future Conditions including Planned Upgrades plus Proposed Upstream Flood Storage	Meets RRBC Recommended Guideline?	Additional Measures Needed to Meet RRBC Recommended Guideline?
Red River Main Stem								
Wahpeton, ND	200 yr	100-125 yr	No	100-125 yr	No	< 200 yr	No	Yes
Breckenridge, MN	200 yr	100-125 yr	No	100-125 yr	No	< 200 yr	No	Yes
Fargo, ND	500 yr	< 100 yr	No	> 200 yr	No	> 200 yr	No	Yes
Moorhead, MN	500 yr	< 100 yr	No	> 200 yr	No	> 200 yr	No	Yes
Georgetown, MN	200 yr	< 100 yr	No	100 yr	No	> 200 yr	Yes	No
Perley, MN	200 yr	< 100 yr	No	100 yr	No	> 200 yr	Yes	No
Hendrum, MN	200 yr	< 100 yr	No	100 yr	No	> 200 yr	Yes	No
Halstad, MN	200 yr	250 yr	Yes	250 yr	Yes	> 250 yr	Yes	No
Shelly, MN	200 yr	< 100 yr	No	100 yr	No	> 200 yr	Yes	No
Nielsville, MN	200 yr	no permanent protection	No	100 yr	No	> 100 yr	No	Yes
Climax, MN	200 yr	no permanent protection	No	100 yr	No	> 100 yr	No	Yes
Grand Forks, ND	500 yr	250 yr	No	250 yr	No	> 500 yr	Yes	No
East Grand Forks, MN	500 yr	250 yr	No	250 yr	No	> 500 yr	Yes	No
Oslo, MN	200 yr	> 200 yr	Yes	> 200 yr	Yes	> 200 yr	Yes	No
Drayton, ND	200 yr	< 100 yr	No	< 100 yr	No	< 100 yr	No	Yes
Pembina, ND	200 yr	100 yr	No	100 yr	No	> 100 yr	No	Yes
St. Vincent, MN	200 yr	< 100 yr	No	>100 yr	No	200 yr	Yes	No
Noyes, MN	200 yr	100 yr	No	100 yr	No	> 100 yr	No	Yes

Total Prevented Damages



Funding for LTFS Recommendations

- Recommendations come with a total price tag of $4.6 billion needed for the U.S. portion of the basin:
  - *Includes $1.77 billion for a proposed diversion channel to protect Fargo-Moorhead*
  - *Assumes federal funding totaling almost $1.7 billion*
- 50-year plan: it would take years, decades to fully implement
- A significant portion of the plan is devoted to temporarily storing water to reduce the severity of flooding
- Includes funding for community projects, rural ring dikes, Devil's Lake initiatives
- The plan calls for storing the equivalent of 1.5 million acre-feet of water south of the Canadian border to ensure a 20 percent reduction in peak flows
- If implemented, the comprehensive plan would prevent significant damage from flooding – between $10.2 billion and $12.8 billion in the basin for a single 500-year flood.

Funding Timeline

Project Implementation Costs

Table D-31 Funding Timeline for Project Implementation Costs along the Red River of the North and Tributaries[6][7]

All costs in millions and are estimated at 2011 price levels

The best available information as of September 2011 is presented in this table. However it is not complete as much of the information has yet to be developed. These costs will change as additional information is developed.

			Total Project Cost	Remaining Project Costs 1st Ten Years (Starts 1 July 2011)					Remaining Funding for Future (After 2021)	Notes
				Total Funding	Federal Funding	Non-Federal Funding [1]	Non-Federal Funding in Minnesota	Non-Federal Funding in North Dakota		
Local Protection Projects										
Red River Main Stem										
	Red	Farmstead and Rural Residence Ring Dikes	$17.0	$3.2	$1.8		$0.4	$1.0	TBD	(8)
	Red	Minnesota Rural Area Buyouts	$12.0	$12.0			$12.0		TBD	
	Red	North Dakota Rural Area Buyouts	$7.0	$7.0	$3.6			$3.4	$0.0	
	Red	Stanley Township, Cass County, ND Levees	$4.0	$4.0				$4.0	$0.0	
	Red	Breckenridge, MN	$41.0	$0.7			$0.7		$0.0	
	Red	Oxbow, ND	$0.4						$0.0	
	Red	Fargo/Moorhead Diversion Project	$1,770.0	$1,770.0	$785.0	$985.0			$0.0	(1, 6)
	Red	Fargo, ND - Other Non-Diversion Projects	$200.0	$200.0				$200.0	$0.0	
	Red	Moorhead, MN - Other Non-Diversion Projects	$70.0	$25.0			$25.0		$0.0	
	Red	Oakport Twp, MN	$33.0	$8.7			$8.7		$0.0	
	Red/ Buffalo	Georgetown, MN	$3.2	$3.2			$3.2		$0.0	
	Red	Perley, MN	$2.7	$0.3			$0.3		$0.0	
	Red	Hendrum, MN	$2.5	$0.3			$0.3		$0.0	
	Red/ Marsh	Shelly, MN	$3.0	$2.0			$2.0		$0.0	
	Red	Nielsville, MN	$3.0	$1.8			$1.8		$0.0	
	Red/ Sand Hill	Climax, MN	$3.0	$2.3			$2.3		$0.0	
	Red	Oslo, MN	$9.0	$9.0			$9.0		$0.0	
	Red	Drayton, ND	TBD							
	Red	Pembina, ND	$0.1						$0.0	
	Red	St. Vincent, MN	$2.9	$2.9			$2.9		$0.0	
Tributaries										
	Sheyenne/Maple/Rush Rivers (ND)									
	Sheyenne	Valley City, ND	$60.0	$60.0	$39.0			$21.0	$0.0	
	Sheyenne	Fort Ransom, ND	TBD							
	Sheyenne	Lisbon, ND	$10.0	$10.0					$0.0	
	Sheyenne	Kindred, ND	$3.0	$3.0					$0.0	
	Sheyenne	Horace, ND							$0.0	(2)
	Sheyenne	West Fargo, ND							$0.0	(2)
	Sheyenne	Reile's Acres, ND							$0.0	(2)
	Maple	Enderlin, ND	$0.3						$0.0	
	Maple	Mapleton, ND	$0.1						$0.0	
	Rush	Amenia, ND	TBD							
	Sheyenne	Harwood, ND							$0.0	(2)
	Sheyenne	Reed Township, Cass County, ND	$4.5	$4.5	$1.8			$2.7	$0.0	

Funding Timeline

Table D-31 Funding Timeline for Project Implementation Costs along the Red River of the North and Tributaries[6][7]

All costs in millions and are estimated at 2011 price levels

The best available information as of September 2011 is presented in this table. However it is not complete as much of the information has yet to be developed. These costs will change as additional information is developed.

		Total Project Cost	Remaining Project Costs 1st Ten Years (Starts 1 July 2011)					Remaining Funding for Future (After 2021)	Notes
			Total Funding	Federal Funding	Non-Federal Funding[1]	Non-Federal Funding in Minnesota	Non-Federal Funding in North Dakota		
Wild Rice River (MN)									
Marsh	Ada, MN	$9.4	$6.0			$6.0		$0.0	
Felton Ditch	Felton, MN	$2.7	$2.7			$2.7		$0.0	
Wild Rice	Buyouts	$1.5	$0.3			$0.3		$0.0	
Red Lake River (MN)									
Cty Ditch 1	Thief River Falls, MN	$1.0						$0.0	
Red Lake	Crookston, MN	$40.0	$6.0			$6.0		$0.0	
Middle/Snake Rivers (MN)									
Snake	Alvarado, MN	$3.0	$3.0			$3.0		$0.0	
Middle	Argyle, MN	$0.8	$0.3			$0.3		$0.0	
Park River (ND)									
Park	Grafton, ND	$42.1	$41.0	$31.6			$9.4	$0.0	
Pembina River (ND)									
Pembina	Neche, ND	$3.0	$3.0	$1.9			$1.1	$0.0	
Roseau River (MN)									
Roseau	Roseau, MN	$40.0	$20.0	$14.0		$6.0		$0.0	
Devils Lake (ND)									
Devils Lake	Devils Lake, ND (City of)	$150.0						$0.0	
Devils Lake	Minnewaukan, ND	$10.5						$0.0	
Devils Lake	Fort Totten, ND	$120.0	$120.0	$120.0				$0.0	
Devils Lake	Tolna Coulee - Control Structure	$14.0	$13.4	$9.9			$3.5	$0.0	(3)
	West End Outlet	TBD						$0.0	(6)
	East End Outlet	$85.0	$85.0				$85.0	$0.0	
	Gravity Outlet	$17.0	$17.0				$17.0	$0.0	
	Buyouts	TBD						$0.0	
	Raise federal aid roads	$190.0	$190.0	$190.0				$0.0	
	Raise township roads	TBD						$0.0	
	Raise railroads	$97.0	$97.0	$64.7			$32.3	$0.0	(4)
	Increase Upper Basin Storage	$75.0	$75.0	$75.0				$0.0	
Subtotal - Local Protection - In United States		***$3,163.5***	***$2,809.6***	***$1,338.2***	***$985.0***	***$92.9***	***$380.4***	***$0.0***	

Funding Timeline

Table D-31 Funding Timeline for Project Implementation Costs along the Red River of the North and Tributaries[6][7]

All costs in millions and are estimated at 2011 price levels

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		Total Project Cost	Remaining Project Costs 1st Ten Years (Starts 1 July 2011)					Remaining Funding for Future (After 2021)	Notes
			Total Funding	Federal Funding	Non-Federal Funding[1]	Non-Federal Funding in Minnesota	Non-Federal Funding in North Dakota		
Upstream Storage Projects									
	Potential Upstream Storage Projects	***$1,463.0***	***$700.0***	***$350.0***		***$175.0***	***$175.0***	***$763.0***	(5)
Other Flood Related Activities									
	Pilot Projects	$10.0	$5.0	$2.5		$1.3	$1.3	$5.0	
	Decision Support Network	$4.0	$4.0	$2.0		$1.0	$1.0	$0.15/yr	
	Forecasting	$2.0	$2.0	$1.0		$0.5	$0.5	$0.15/yr	
	FEMA Flood Plain Mapping with LiDAR data	TBD							
	Transportation Upgrades	TBD							
	404 Retention Permitting Coordination	$1.0	$1.0	$0.5		$0.3	$0.3	$1.0	
	Drainage	TBD							
	Conservation Program Funding	TBD							
Subtotal - Other Flood Related Activities		***$17.0***	***$12.0***	***$6.0***	***$0.0***	***$3.0***	***$3.0***	***$6.0***	
TOTAL FOR UNITED STATES IN RED RIVER BASIN		$4,643.5	$3,521.6	$1,694.2	$985.0	$270.9	$558.4	$769.0	

TBD To be determined

Notes:

(1) The estimated amounts of the Federal and non-Federal Fargo/Moorhead LPP Diversion project total costs are based on the Fargo-Moorhead Metropolitan Area Flood Risk Management project Supplemental Draft Feasibility Report and Environmental Impact Statement, April 2011. Final cost sharing amounts between the non-Federal partners have not yet been determined.

(2) Additional local protection included as a part of the Fargo-Moorhead LPP North Dakota diversion project cost listed under Fargo and Moorhead at the top of this table.

(3) Tolna Coulee cost includes $14 million for the control structure to prevent significant erosion in case of a natural overflow.

(4) Cost sharing for raising railroad embankment at Devils Lake estimated to be one-third cost shared by Burlington Northern Santa Fe Railway, one-third by Amtrak, and one-third by the North Dakota Department of Transportation through a US Department of Transportation grant.

(5) Federal participation in potential upstream storage projects is assumed to be available through future U.S. Farm Bill at approximately 50 percent cost sharing; however, actual Federal funding availability and cost sharing amounts is uncertain. Also, implementation of projects in each state is assumed to be at comparable levels, however this will depend on project implementation schedules by each state.

(6) Operation and maintainance (O&M) costs of projects are not included in this tabulation, eventhough in some cases the O&M costs may be substantial. O&M costs are typically a non-Federal or local responsibility and should also be considered in the implementation decision for a project.

(7) Information on specific projects at individual communities can be found on the City Assessment tables in Appendix C.

(8) Funding for farmstead and rural ring dikes depend on the number of landowners requesting assistance. A rough estimate based on funding from recent years is included.

RECOMMENDATIONS

1. Biggest Risks
   - Fargo-Moorhead & Devils Lakes
2. Level of Protection Goals
3. Floodplain Management
4. Retention
5. Administration, Policy, Coordination, Research, Data
6. Basin Funding Strategy

NEXT STEPS

- Report to State Funders
  - MN December 2011
  - ND April 2012
- Share report with others
  - For the information
  - Act on Recommendations
  - Use as a basin-wide guide
- Begin 2012 Update

INPUT/QUESTIONS/CONTACT

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