



One Watershed, One Plan: A Case Study of Integrated Watershed Planning for multiple Benefits

Illinois Association for Floodplain and Stormwater Management

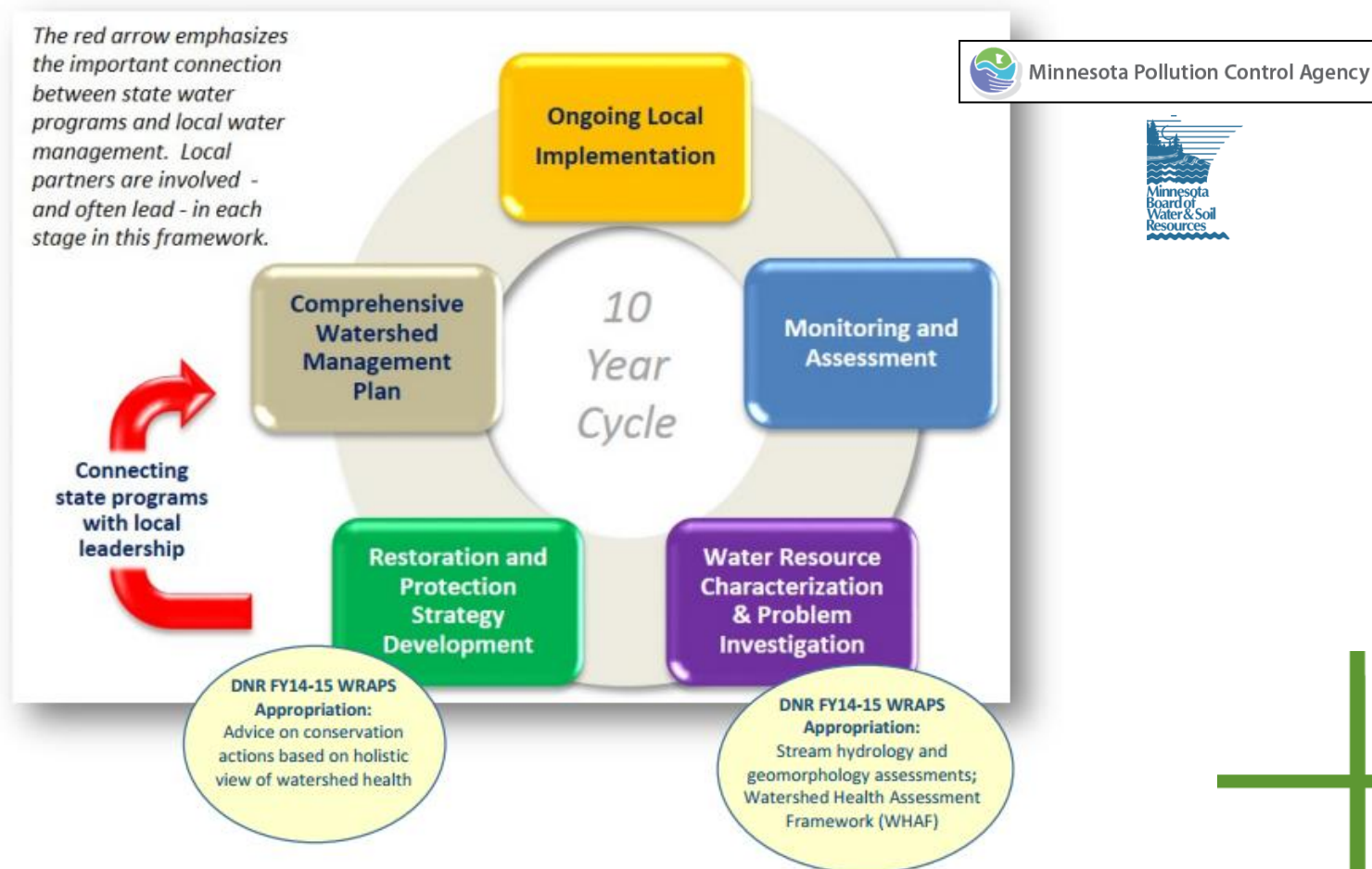
2017 Annual Conference
March 8 and 9, 2017

Shawn Tracy

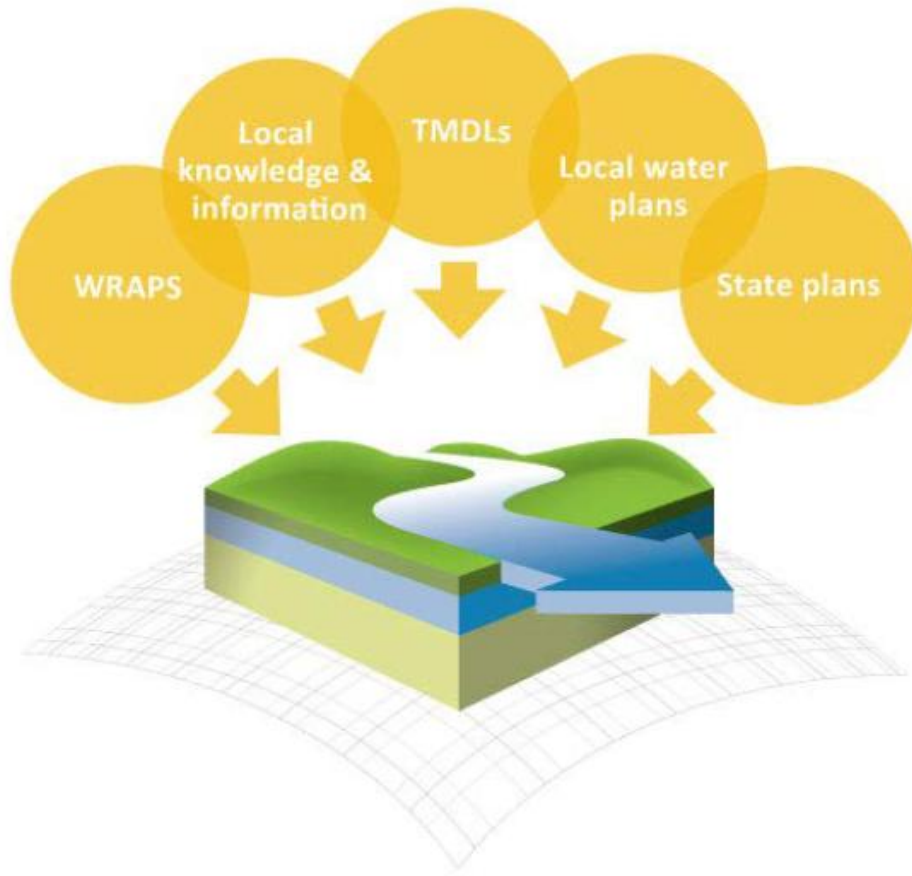
Water Resources Project Manager
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Minnesota Water Management Framework



1W1P in a Nutshell

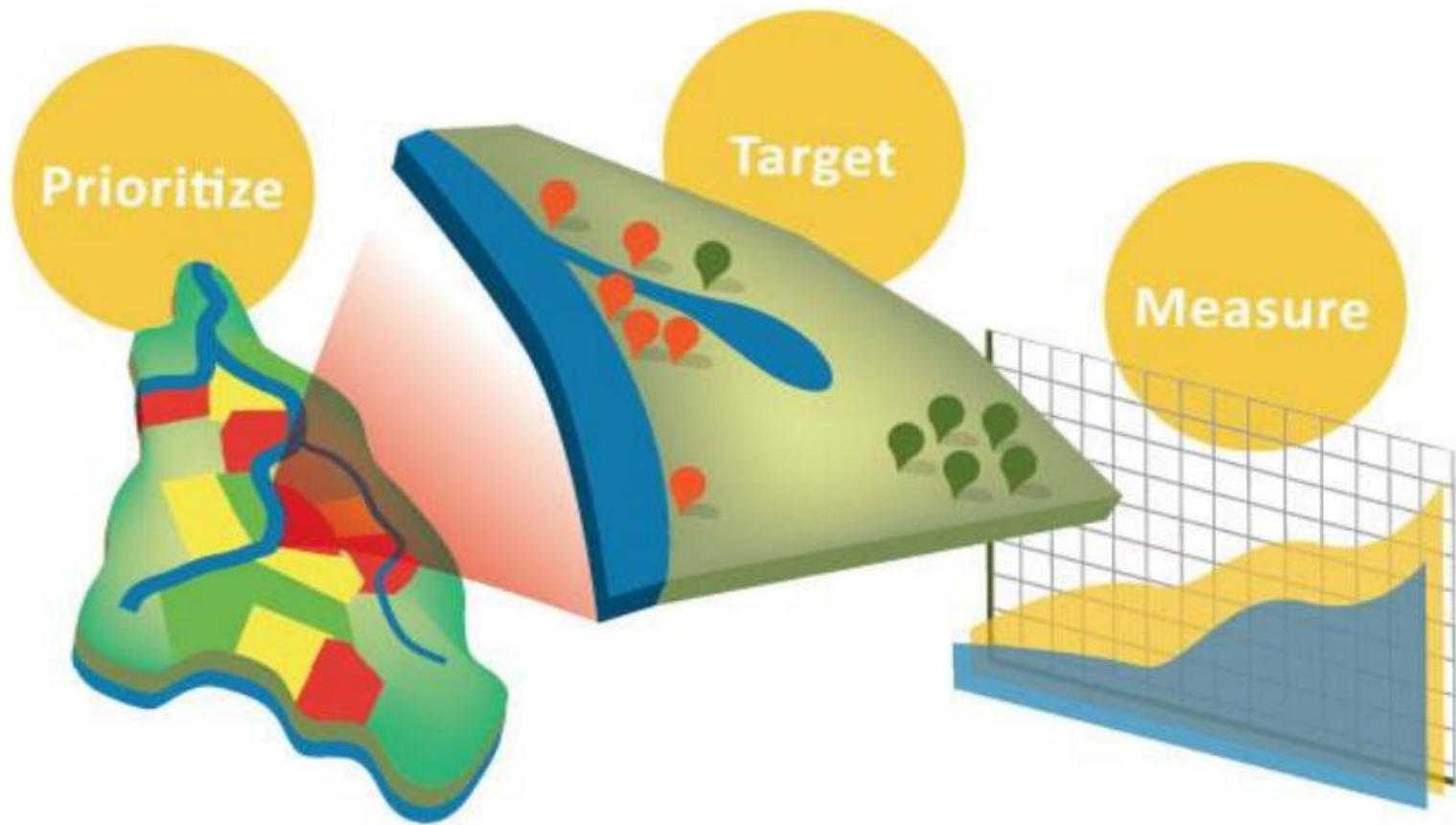


Comprehensive watershed implementation plan

Assembles integrated issues, priorities, goals and implementation strategies



Enhanced value on effort & expenditures



Issues of Concern within 1W1P

- Surface & ground water quality
- Groundwater recharge
- Flood damage reduction
- Wetlands
- Shoreland and riparian zone
- Fish and wildlife habitat
- Water recreational facilities
- Soil health
- Altered hydrology
- Water supply (protect, provide and conserve)
- Drainage system management
- Wastewater management
- Drought mitigation



Multifunctional planning promotes sustainability



There is value in multifunctional-focused policy that promote sustainable practices



Environmental



Social



Economic



Multifunctional planning promotes sustainability



**QUALITY
OF LIFE**



**RESOURCE
ALLOCATION**



**CLIMATE
AND RISK**



LEADERSHIP



**NATURAL
WORLD**



ENVISIONTM

CREDIT LIST



QUALITY OF LIFE
13 Credits

1 PURPOSE

- QL1.1 Improve Community Quality of Life
- QL1.2 Stimulate Sustainable Growth & Development
- QL1.3 Develop Local Skills & Capabilities

2 WELLBEING

- QL2.1 Enhance Public Health & Safety
- QL2.2 Minimize Noise and Vibration
- QL2.3 Minimize Light Pollution
- QL2.4 Improve Community Mobility & Access
- QL2.5 Encourage Alternative Modes of Transportation
- QL2.6 Improve Site Accessibility, Safety & Wayfinding

3 COMMUNITY

- QL3.1 Preserve Historic & Cultural Resources
- QL3.2 Preserve Views & Local Character
- QL3.3 Enhance Public Space
- QL0.0 Innovate or Exceed Credit Requirements



LEADERSHIP
10 Credits

1 COLLABORATION

- LD1.1 Provide Effective Leadership & Commitment
- LD1.2 Establish A Sustainability Management System
- LD1.3 Foster Collaboration & Teamwork
- LD1.4 Provide for Stakeholder Involvement

2 MANAGEMENT

- LD2.1 Pursue By-Product Synergy Opportunities
- LD2.2 Improve Infrastructure Integration

3 PLANNING

- LD3.1 Plan For Long-Term Monitoring & Maintenance
- LD3.2 Address Conflicting Regulations & Policies
- LD3.3 Extend Useful Life
- LD0.0 Innovate or Exceed Credit Requirements



RESOURCE ALLOCATION
14 Credits

1 MATERIALS

- RA1.1 Reduce Net Embodied Energy
- RA1.2 Support Sustainable Procurement Practices
- RA1.3 Use Recycled Materials
- RA1.4 Use Regional Materials
- RA1.5 Divert Waste From Landfills
- RA1.6 Reduce Excavated Materials Taken Off Site
- RA1.7 Provide For Deconstruction & Recycling

2 ENERGY

- RA2.1 Reduce Energy Consumption
- RA2.2 Use Renewable Energy
- RA2.3 Commission & Monitor Energy Systems

3 WATER

- RA3.1 Protect Fresh Water Availability
- RA3.2 Reduce Potable Water Consumption
- RA3.3 Monitor Water Systems

RA0.0 Innovate or Exceed Credit Requirements



NATURAL WORLD
15 Credits

1 SITING

- NW1.1 Preserve Prime Habitat
- NW1.2 Protect Wetlands & Surface Water
- NW1.3 Preserve Prime Farmland
- NW1.4 Avoid Adverse Geology
- NW1.5 Preserve Floodplain Functions
- NW1.6 Avoid Unsuitable Development on Steep Slopes
- NW1.7 Preserve Greenfields

2 LAND + WATER

- NW2.1 Manage Stormwater
- NW2.2 Reduce Pesticide & Fertilizer Impacts
- NW2.3 Prevent Surface & Groundwater Contamination

3 BIODIVERSITY

- NW3.1 Preserve Species Biodiversity
- NW3.2 Control Invasive Species
- NW3.3 Restore Disturbed Soils
- NW3.4 Maintain Wetland & Surface Water Functions

NW0.0 Innovate or Exceed Credit Requirements



CLIMATE AND RISK
8 Credits

1 EMISSIONS

- CR1.1 Reduce Greenhouse Gas Emissions
- CR1.2 Reduce Air Pollutant Emissions

2 RESILIENCE

- CR2.1 Assess Climate Threat
- CR2.2 Avoid Traps & Vulnerabilities
- CR2.3 Prepare For Long-Term Adaptability
- CR2.4 Prepare For Short-Term Hazards
- CR2.5 Manage Heat Island Effects

CR0.0 Innovate or Exceed Credit Requirements



Multifunctional planning promotes sustainability



Within Water Resources Management nationwide, watershed-based sustainable implementation via integrated planning is growing



EPA



APWA



NACWA



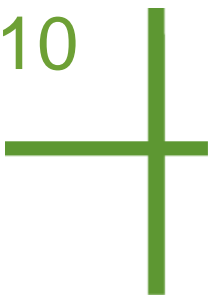
ISI



WEF



MN 1W1P and 8410



1W1P Steps

Identification of Issues and
Resources of Concern

Development of
Prioritization
Statements

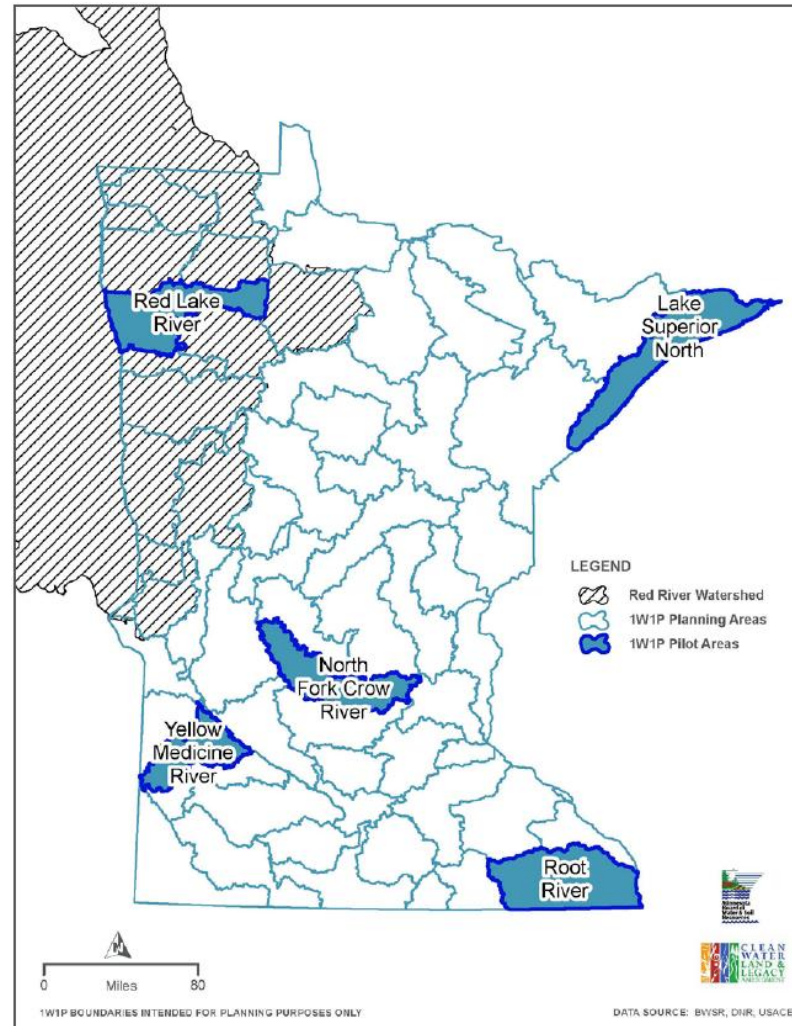
Alignment with
Resources of
Concern with
Prioritization
Statements

Establish
Measurable Goals
for each Resource
of Concern

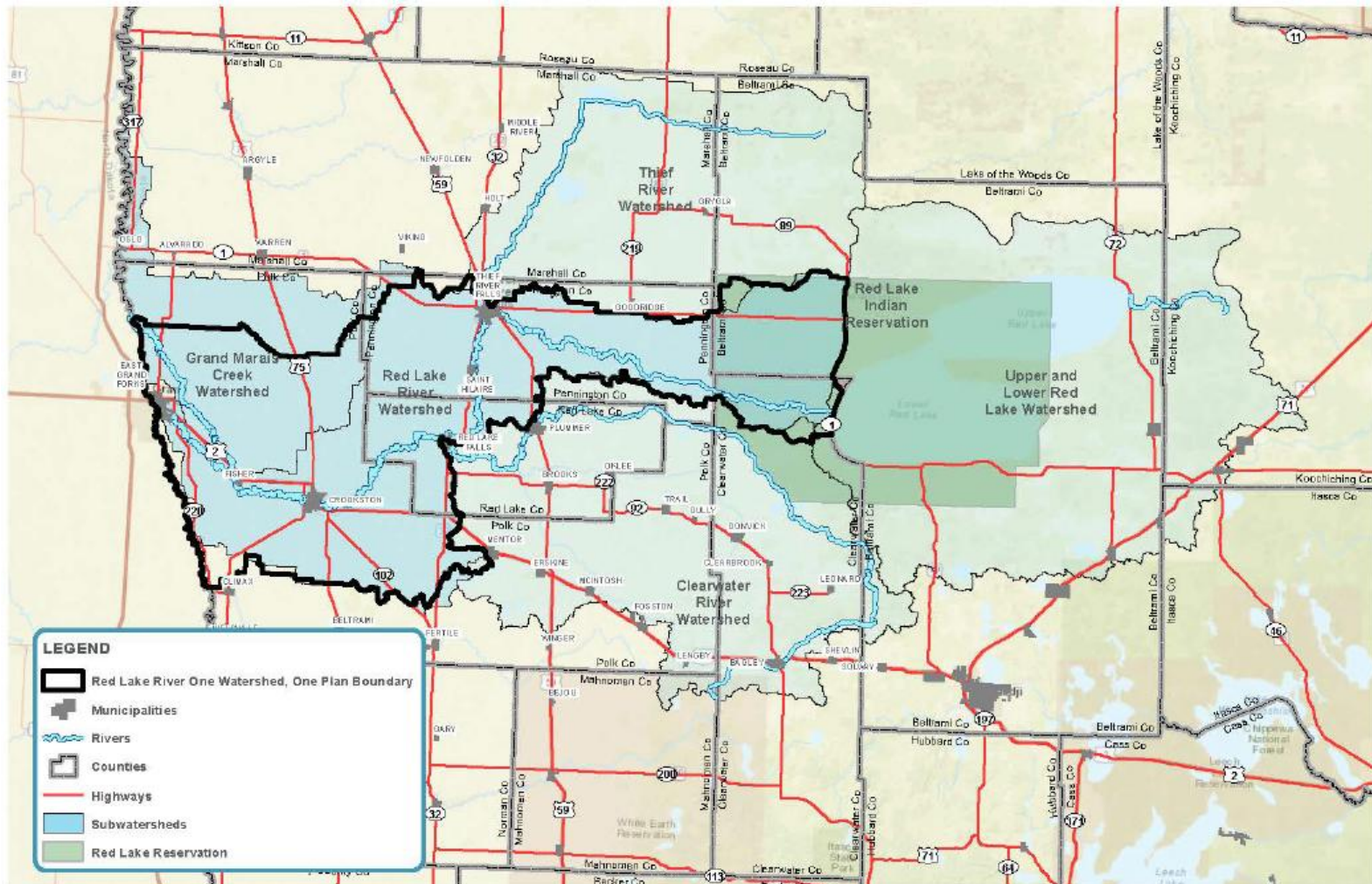
Develop
Implementation
Plans



1W1P Pilot Planning Areas



Case Study: Red Lake River 1W1P



Case Study: Red Lake River 1W1P

Issue of Concern: Surface Water Quality

- Restore impaired waters that are closest to meeting state water quality standards.
- Protect high-quality unimpaired waters at greatest risk of becoming impaired.
- Continue long-term monitoring efforts at key locations to provide sufficient data for water quality, hydrologic, hydraulic and biotic analysis.
- Restore or improve other impaired waters.

Issue of Concern: Soil Erosion and Sedimentation

- Reduce runoff-driven sediment transport to impaired waters that are closest to meeting state water quality standards by targeting implementation in subwatersheds with highest export.
- Reduce wind erosion with priority on highly erodible soils by targeting implementation in subwatersheds with highest export.
- Reduce runoff-driven sediment transport to high-quality unimpaired waters at greatest risk of becoming impaired by targeting implementation in subwatersheds with highest export.
- Protect priority stream and river channels (those most susceptible to altered hydrology effects on bank and bed stability).
- Inventory and evaluate the severity of erosion problems and risks in terms of the local resource as well as downstream resources to guide implementation strategy.
- Reduce runoff-driven sediment transport to other impaired waters by targeting implementation in subwatersheds with highest export.
- Identify, quantify and plan for agricultural practices that promote conservation.

Case Study: Red Lake River 1W1P

Issue of Concern: Altered Hydrology

- Reduce runoff rates by targeting implementation in subwatersheds with high runoff.
- Identify ideal locations for flood control structures that include multifunctional design (buffer strips, side water inlets and dikes to ditches and waterways, floodwater retention structures such as retention ponds, dams and diversions).
- Protect disconnected, non-contributing drainage areas from future altered hydrology leading to a connection to water resources downstream.
- Restore or modify natural water course morphology where feasible to promote adequate drainage as well as channel equilibrium to ensure reduced bank failure, bed aggradation or degradation and allow for natural meander migration and habitat.
- Assure long-term maintenance of multi-purpose flood control structures.
- Promote infiltration, retention, and extended detention practices in new and existing urban developments based on current stormwater best management practices.

Issue of Concern: Drainage System Management

- Utilize information collected from the drainage ditch inventories to prioritize and install side water inlets and buffer strips to ensure adequate support of agriculture without negative downstream ecological and economic impacts.
- Use current drainage water management practices on retrofits or installation of new surface and subsurface drainage.
- Retrofit or install new subsurface drainage using current drainage water management practices.

Case Study: Red Lake River 1W1P

Issue of Concern: Flood Damage Reduction

- Reduce the risk of flood damage in accordance with the 20% Red River Basin Commission's Long Term Flood Solutions and Technical Paper #11.
- Reduce flood flows and breakout flows to reduce damages to local communities, infrastructure, rural homes, and agricultural fields.

Issue of Concern: Habitat

- Protect or restore aquatic habitat of DNR priority reaches.
- Protect, restore, and enhance grasslands and wetlands with special emphasis on prairie core areas and corridor complexes.
- Identify areas that provide both unique ecological values and recreational opportunities and develop an implementation and management plan.
- Expand aquatic and terrestrial non-native and invasive species control programs.
- Restore longitudinal connectivity of priority reaches.

Case Study: Red Lake River 1W1P

Issue of Concern: Shoreland and Riparian Management

- Protect riparian corridors and wetlands with existing quality vegetated buffers.
- Restore or enhance quality vegetated buffers adjacent to natural, altered and artificial watercourses and wetlands.

Issue of Concern: Groundwater Protection

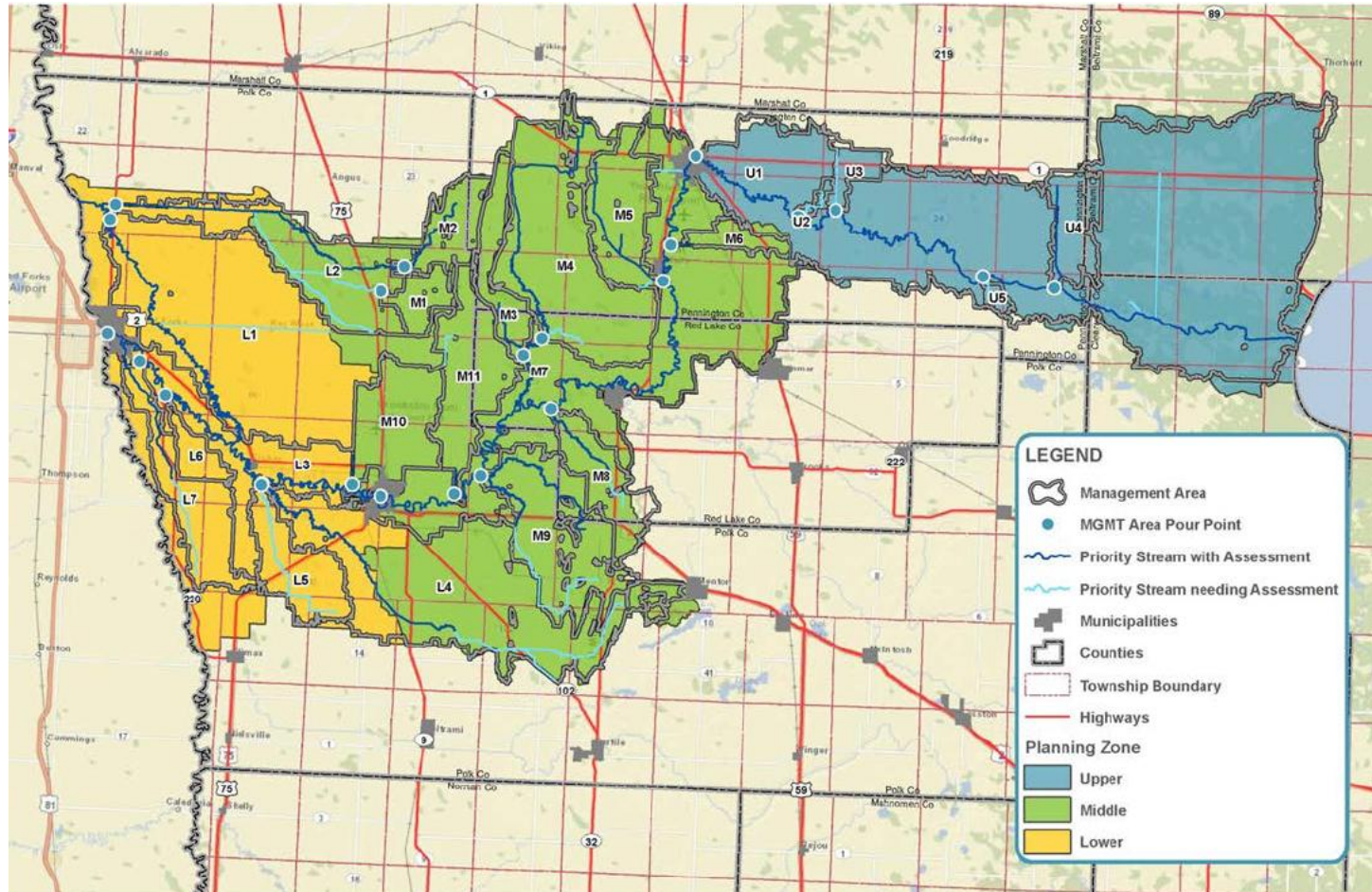
- Maintain a safe and adequate drinking water supply for residents in order to protect the public's health, safety and general welfare of the community.
- Protect Drinking Water Supply Management Areas (DWSMAs). Special consideration will be given for DWSMAs with a moderate or high vulnerability.
- Implement MN Department of Ag's Nitrogen Fertilizer Management Plan
- Implement strategies to conserve ground water supply quality.
- Implement strategies to conserve ground water supply quantity.
- Conduct sub-surface sewage treatment system (SSTS) inventory and upgrades.
- Work collaboratively with public water suppliers to implement their Wellhead Protection Plans.
- Groundwater appropriations do not adversely impact fish habitat, fens other groundwater dependent surface water features, or other groundwater dependent biological communities.

Issue of Concern: Source Water Protection

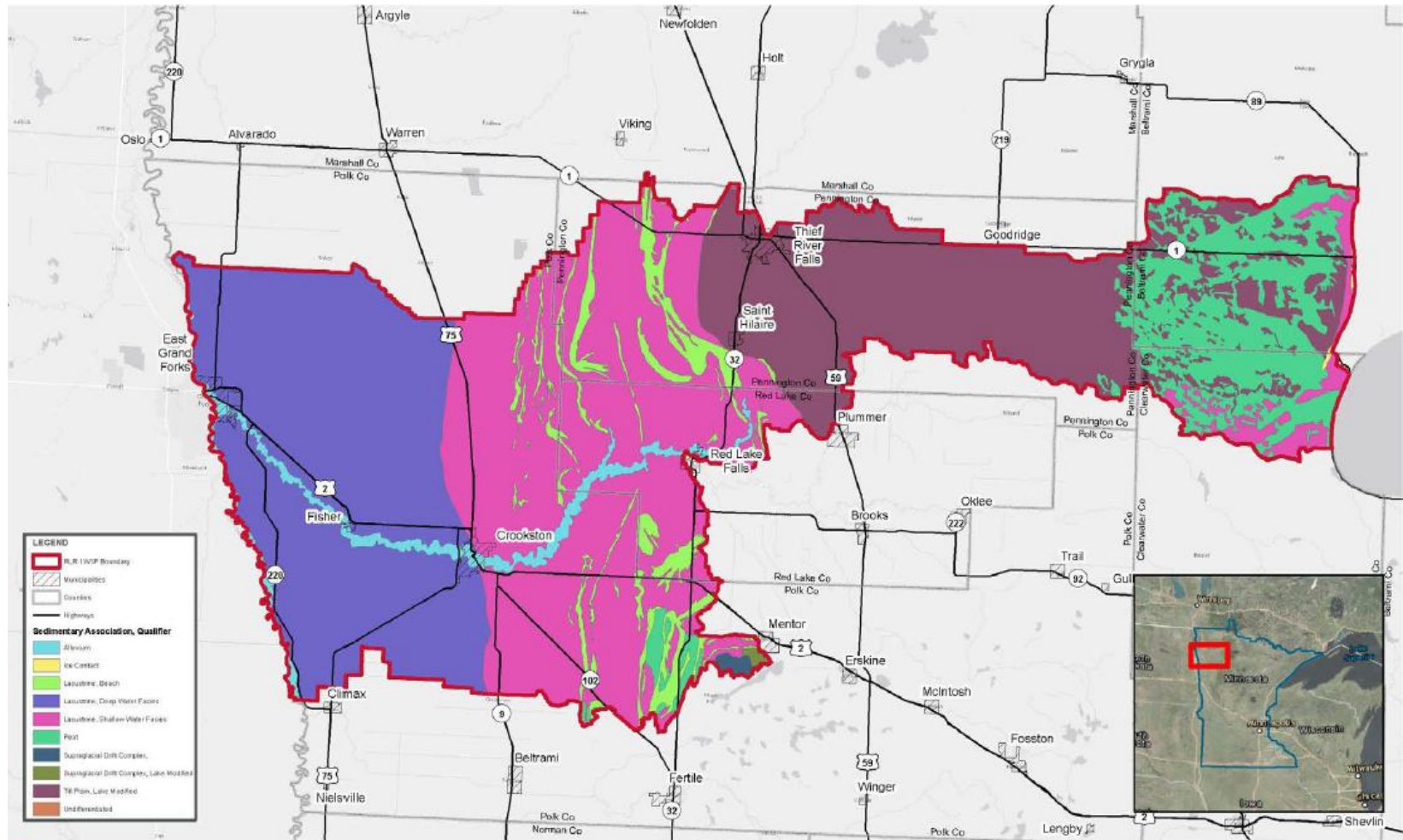
- Partnership with the East Grand Forks and Thief River Falls public water suppliers to protect and maintain a safe and adequate drinking water supply.
- Reduce runoff-driven sediment and pollutant (total organic carbon, haloacetic acid, and Trihalomethanes) transport to surface waters by targeting implementation in subwatersheds with highest export.
- Conserve surface water drinking supplies.
- Maintain a safe and adequate drinking water supply for residents in order to protect the public's health, safety and general welfare of the community.
- Protect Thief River Falls Source Water Assessment Area (SWAA).
- Protect East Grand Forks Source Water Assessment Area (SWAA).
- Protect surface water quality and quantity of East Grand Forks drinking water supply.



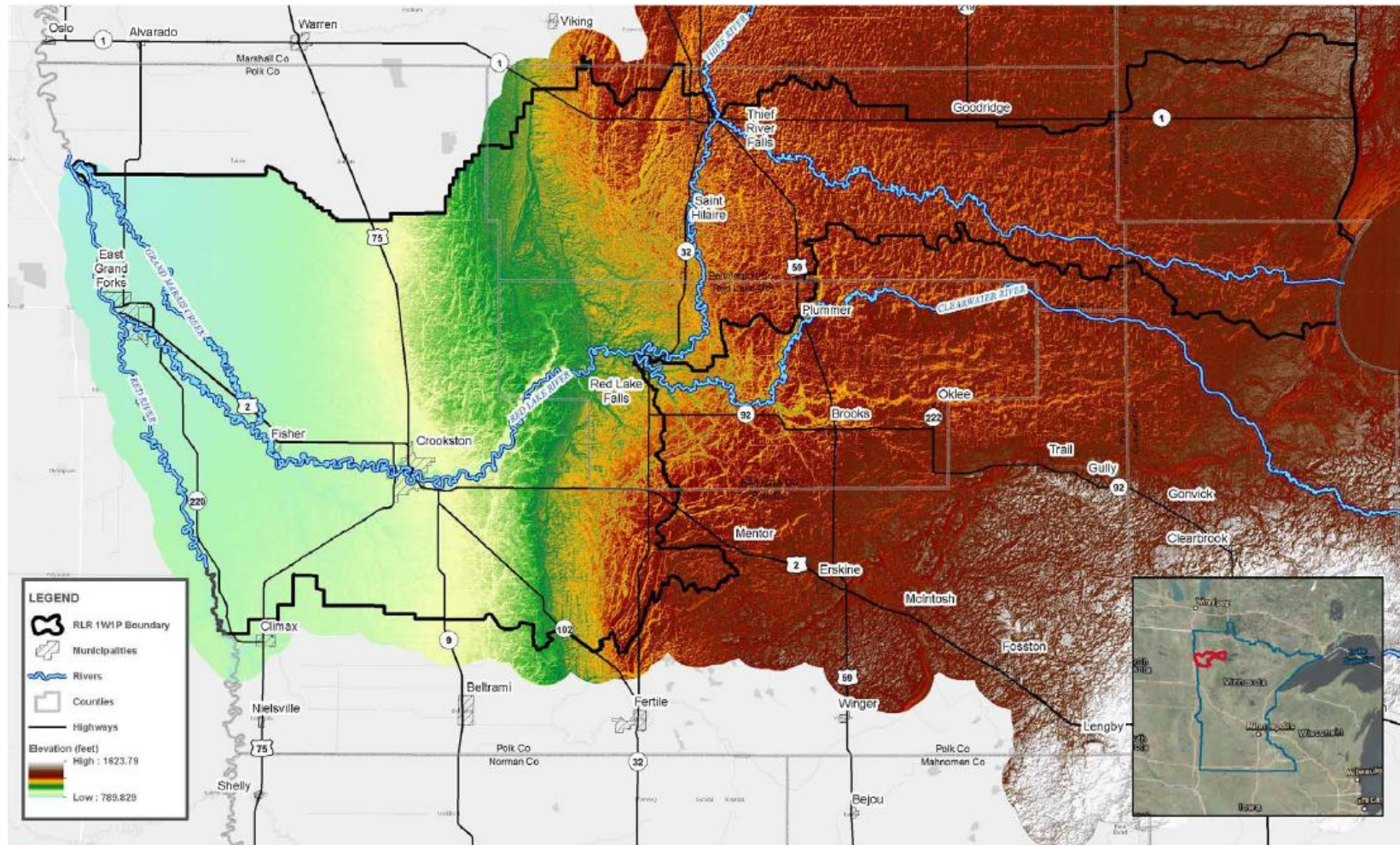
Case Study: Red Lake River 1W1P



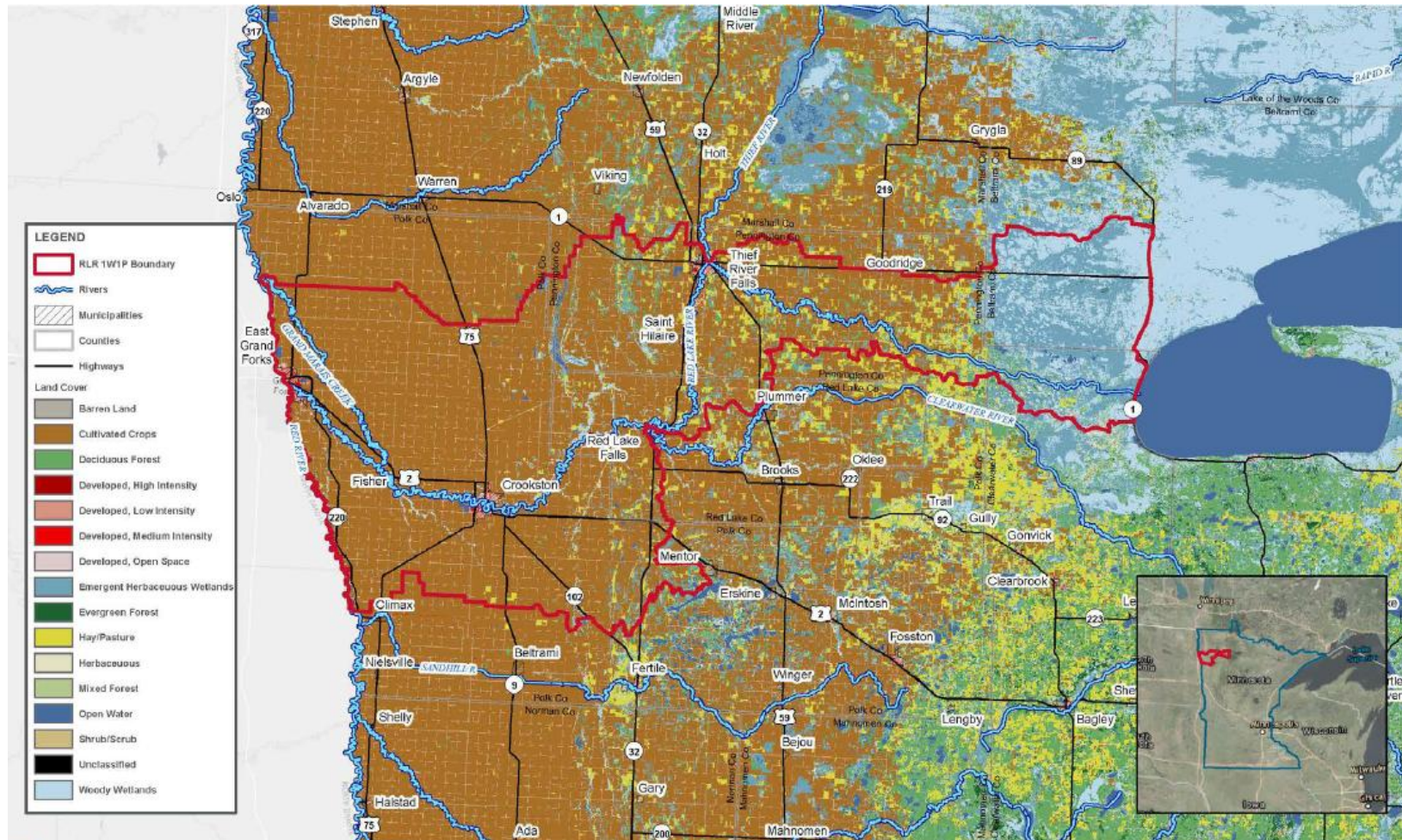
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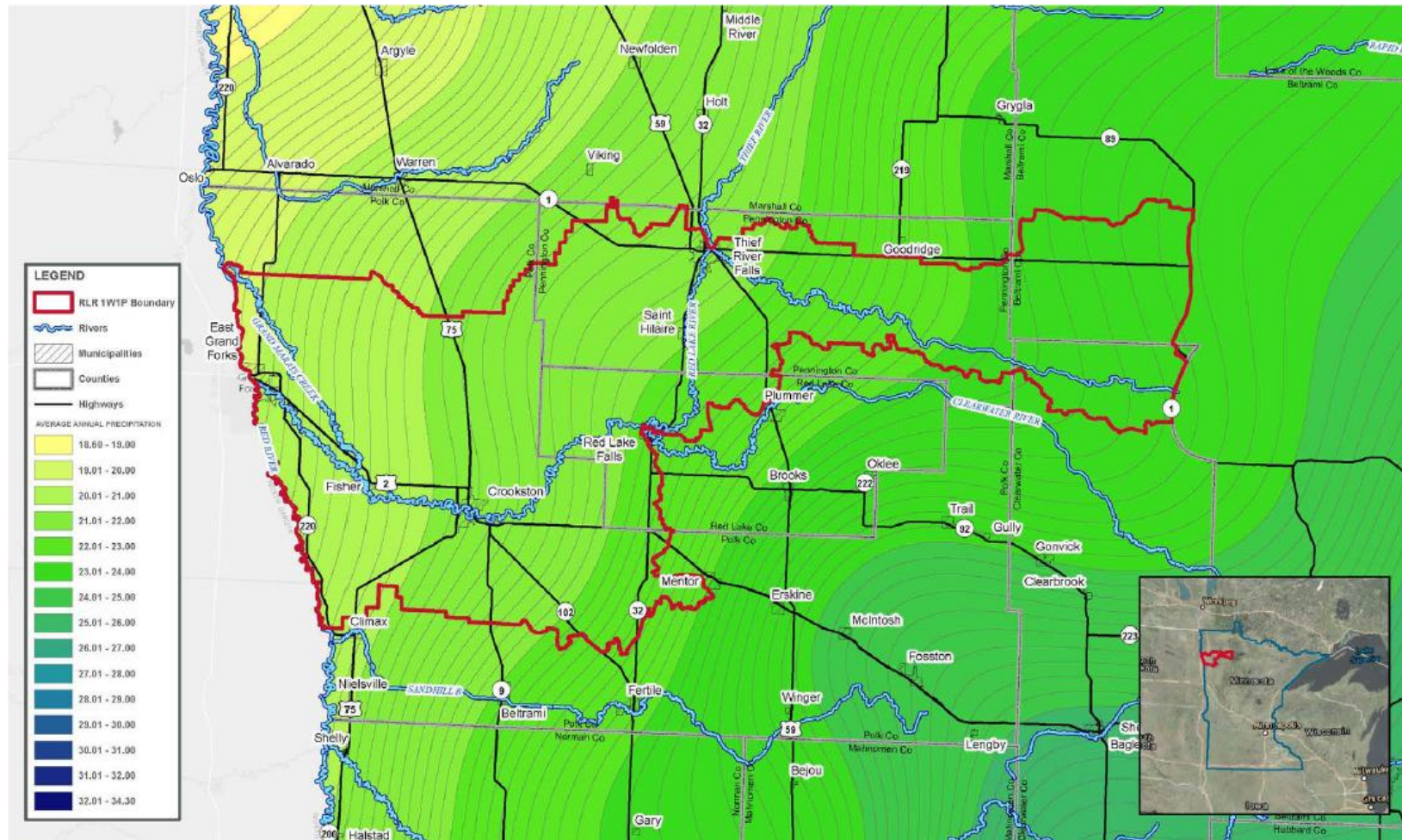
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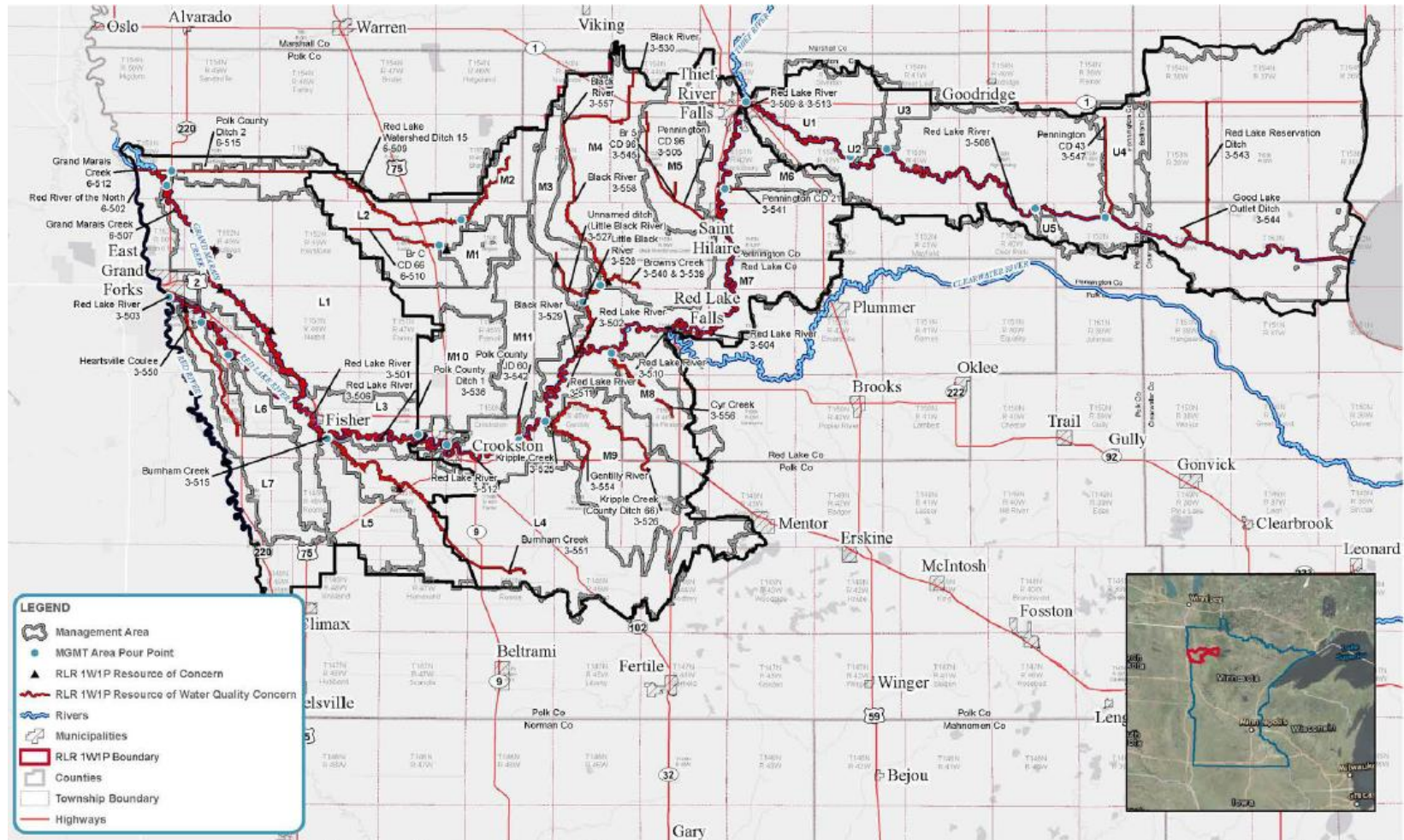
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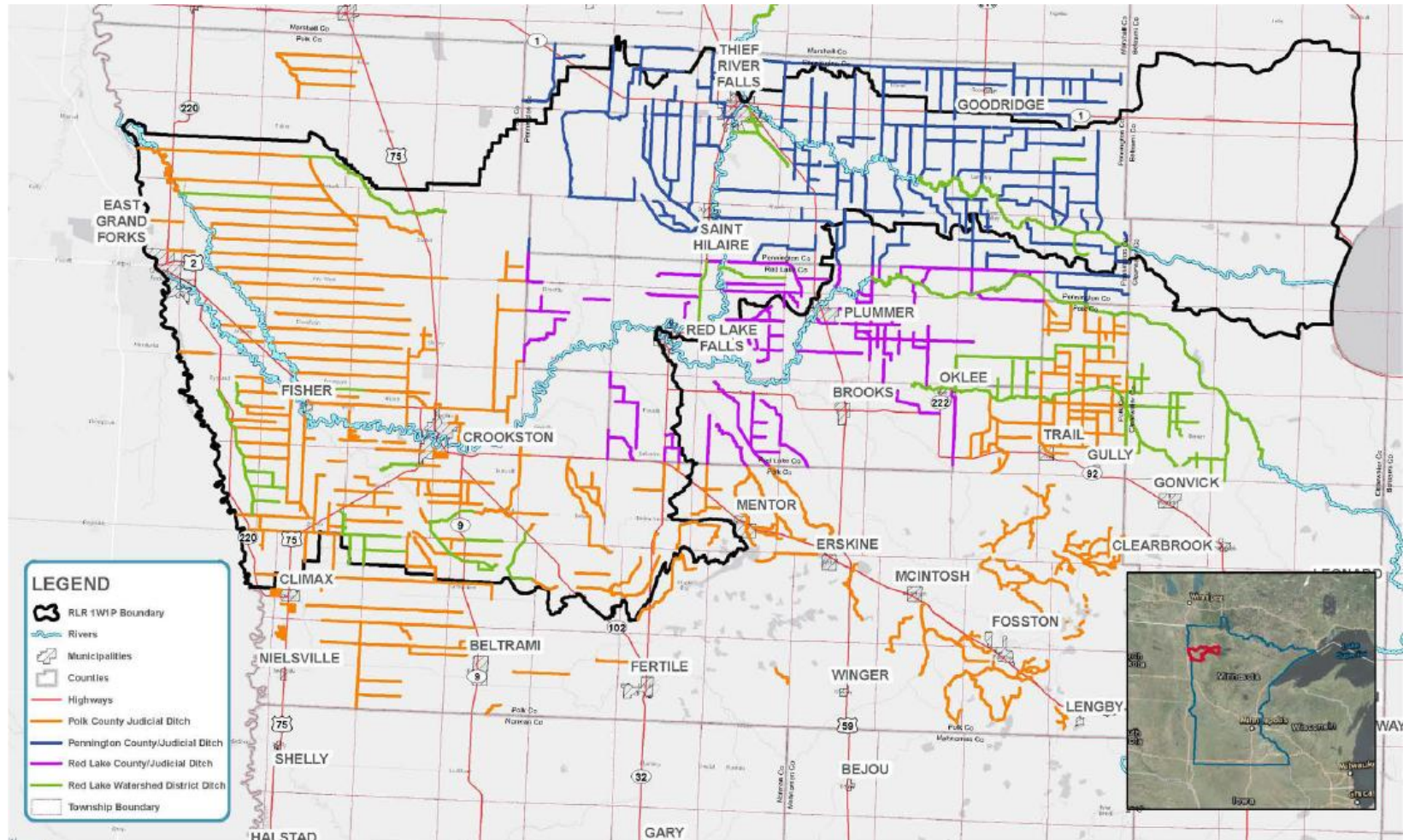
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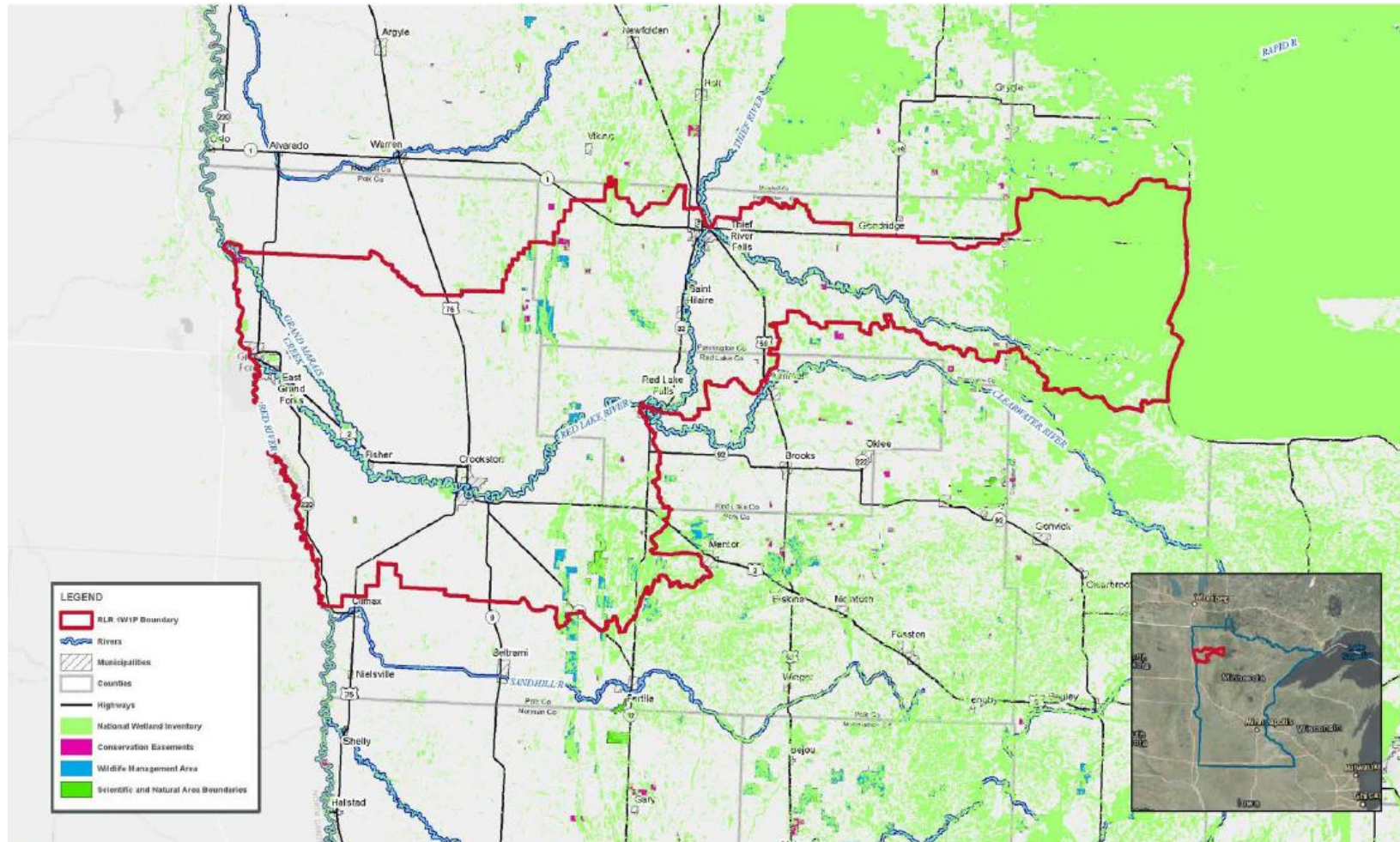
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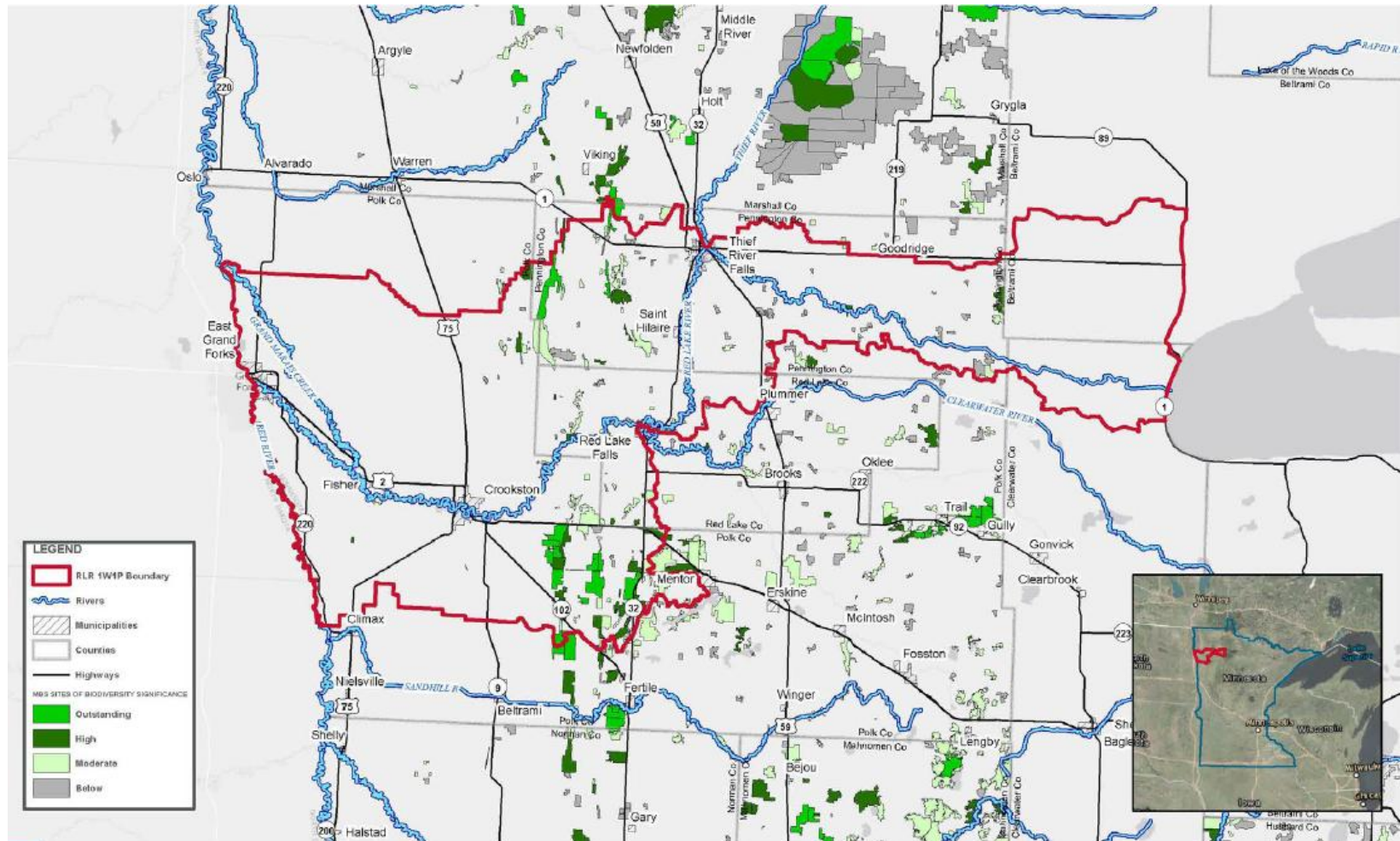
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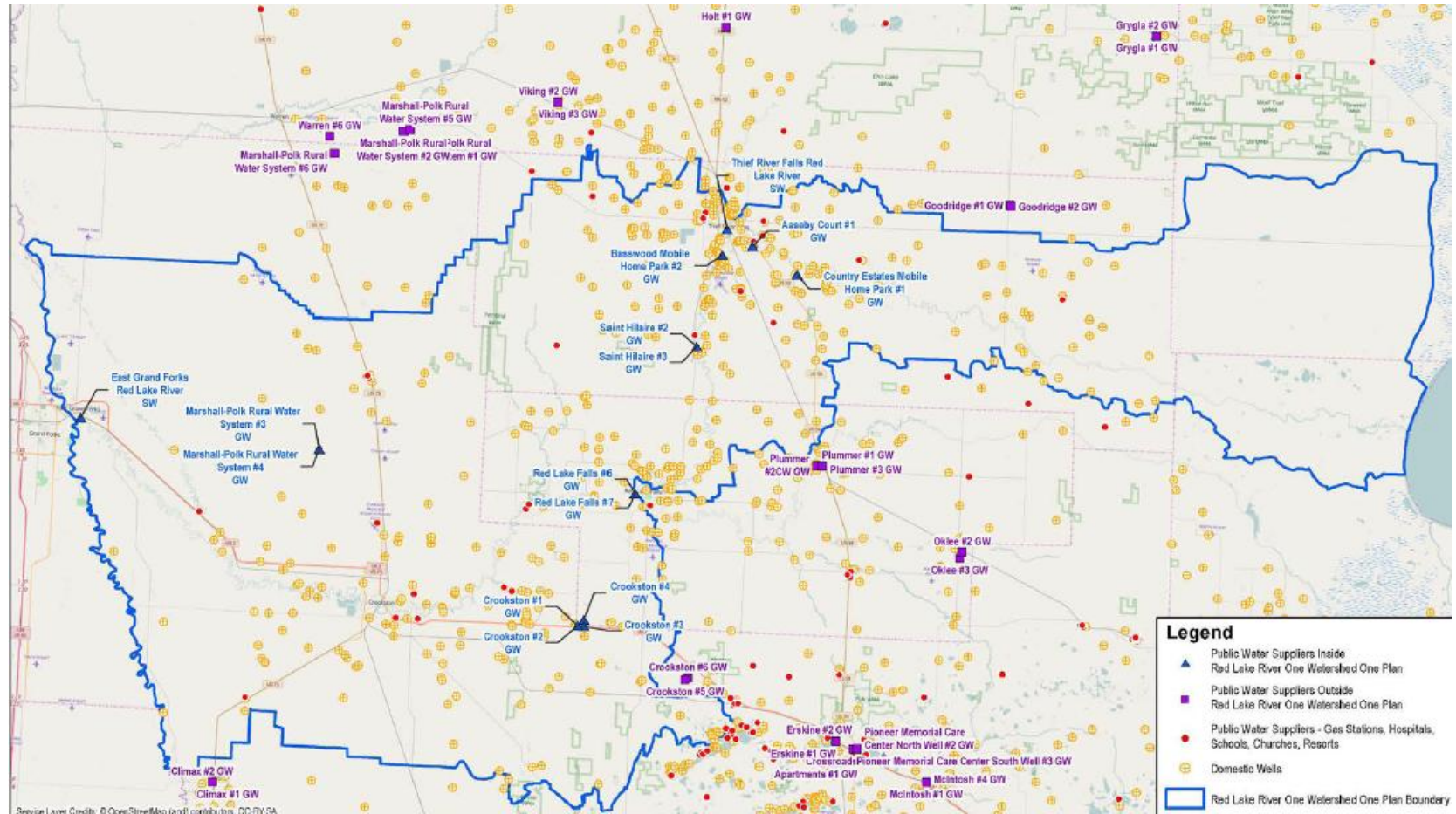
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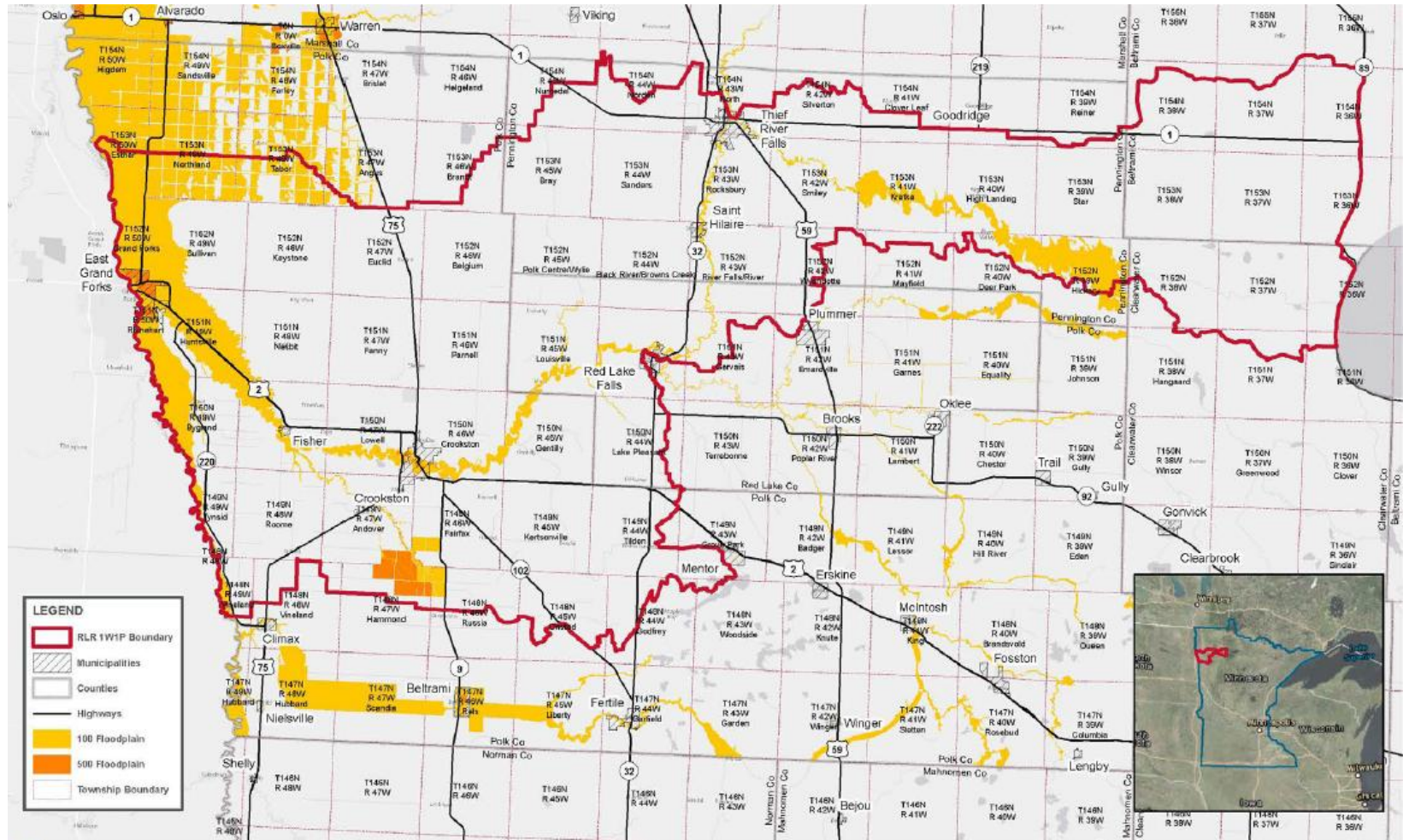
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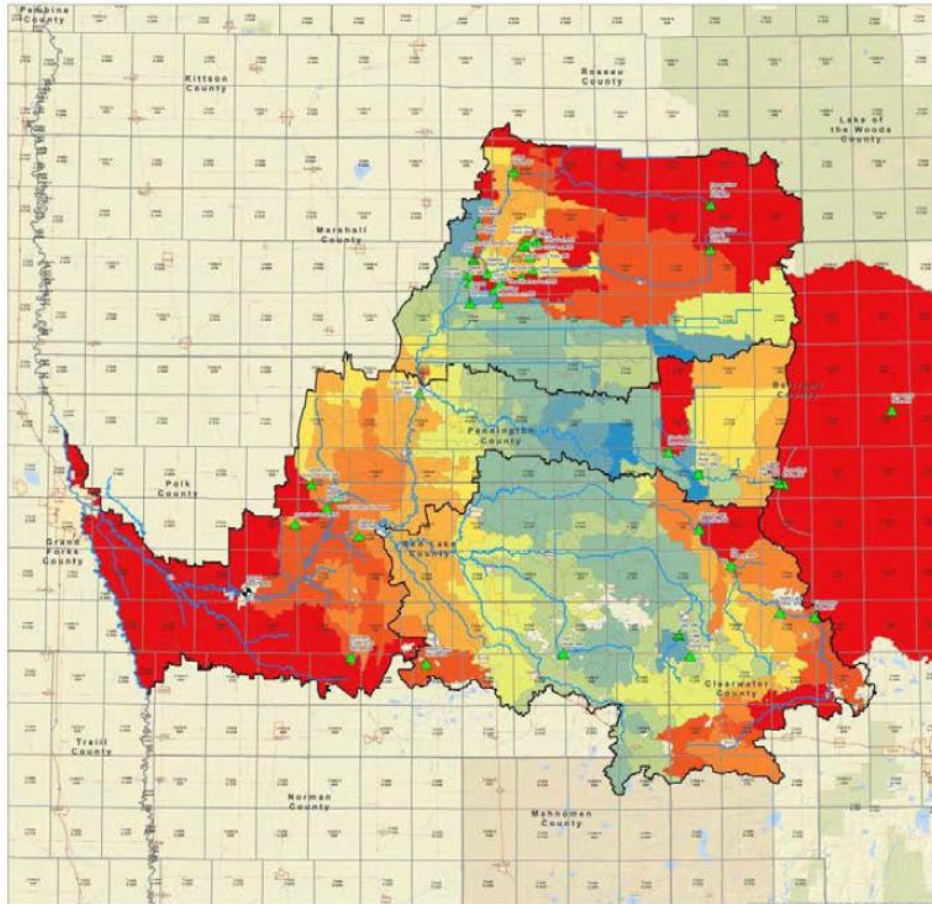
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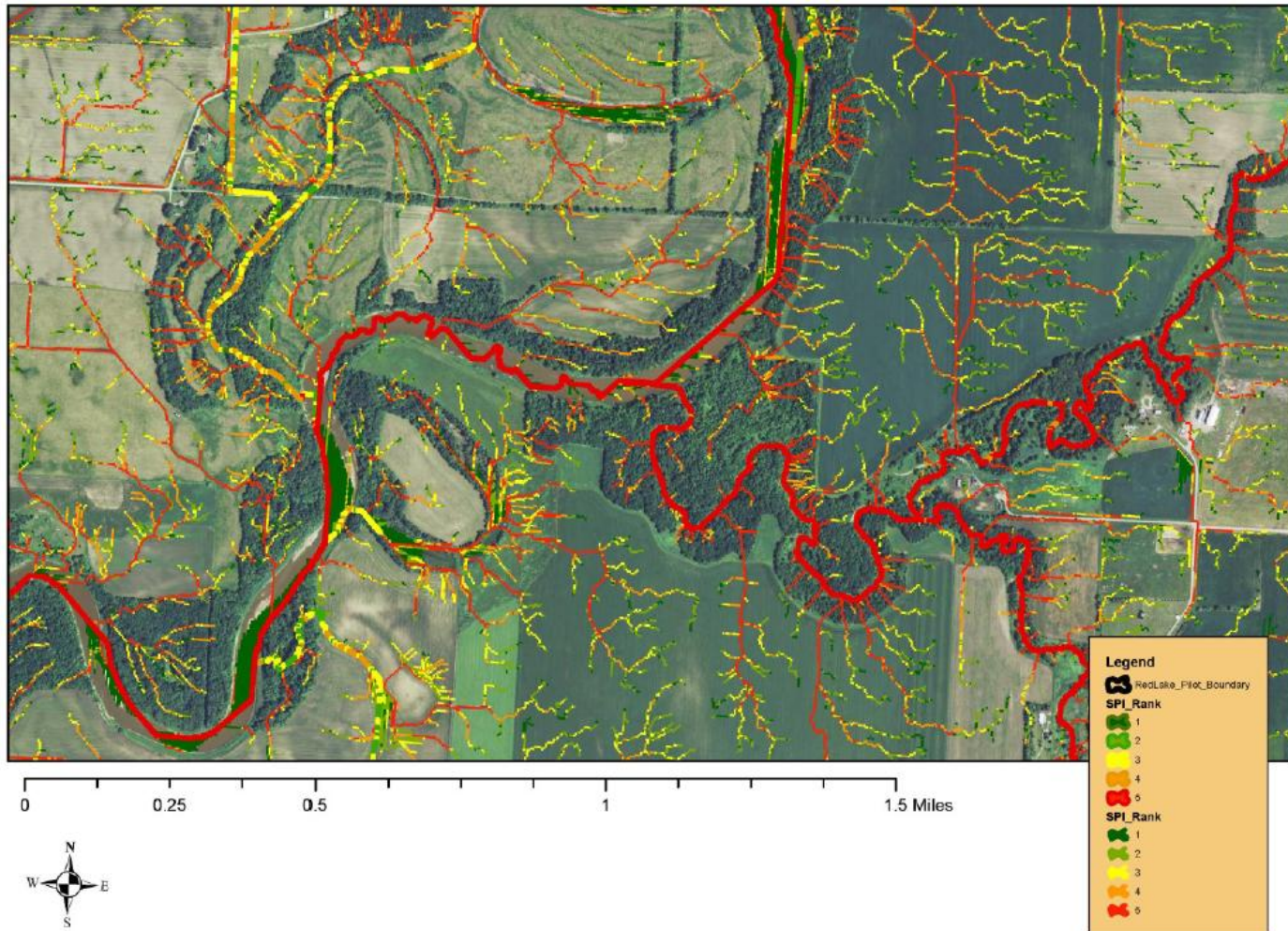


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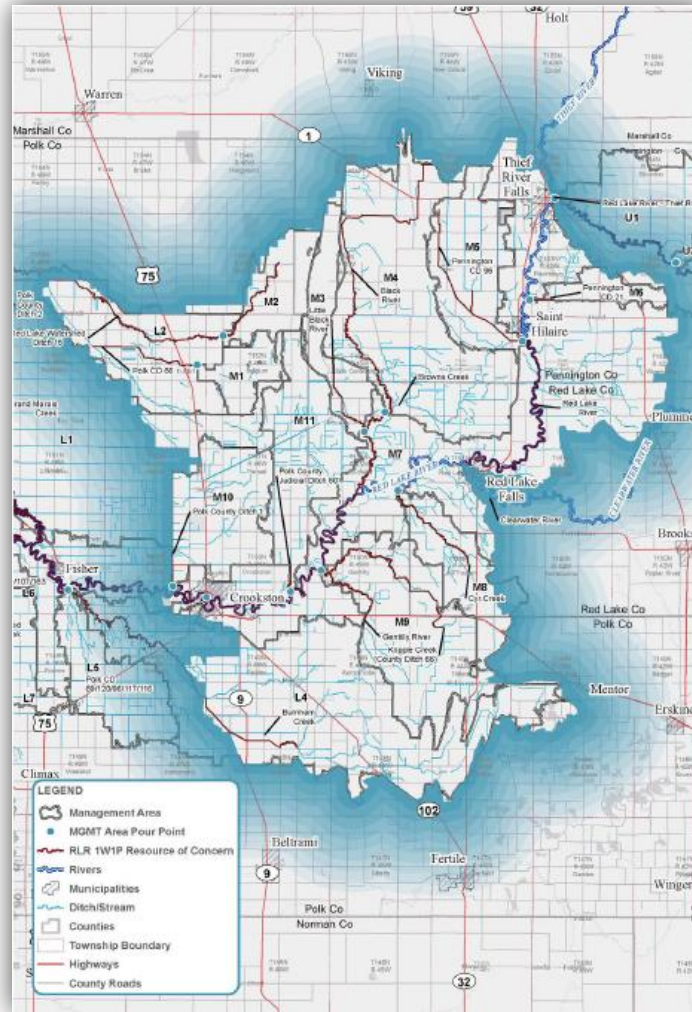


Flood Damage Reduction Measure	Early* Upstream Area	Middle* Upstream Area	Late* Upstream Area
1) Reduce Flood Volume	+	++	++
a) Wetlands	+	+	++
b) Cropland BMPs	+	++	++
c) Conversion to grassland	+	++	++
d) Conversion to forest	+	++	++
e) Other beneficial uses of stored water	+	++	++
2) Increase Conveyance Capacity	+	-	--
a) Channelization	+	-	--
b) Drainage	+	-	--
c) Diversion	+	Variable	-
d) Setting back existing levees (to increase conveyance capacity)	+	-	--
e) Increasing bridge capacity	+	-	-
3) Increase Temporary Flood Storage	Variable	++	+
a) Gated impoundments	+	++	++
b) Ungated impoundments	-	+	+
c) Restored or created wetlands	-	+	+
d) Drainage	-	+	++
e) Culvert sizing	-	+	+
f) Setting back existing levees (to increase floodplain storage)	+	++	+
g) Overtopping levees	++	+	Variable
4) Protection/Avoidance	Variable	Variable	Variable
a) Urban levees	-	-	-
b) Farmstead levees	-	-	-
c) Agricultural levees	-	-	-
d) Evacuation of the floodplain	-	-	-
e) Floodproofing	-	-	-
f) Warning and emergency response	-	-	-

Case Study: Red Lake River 1W1P



Case Study: Red Lake River 1W1P



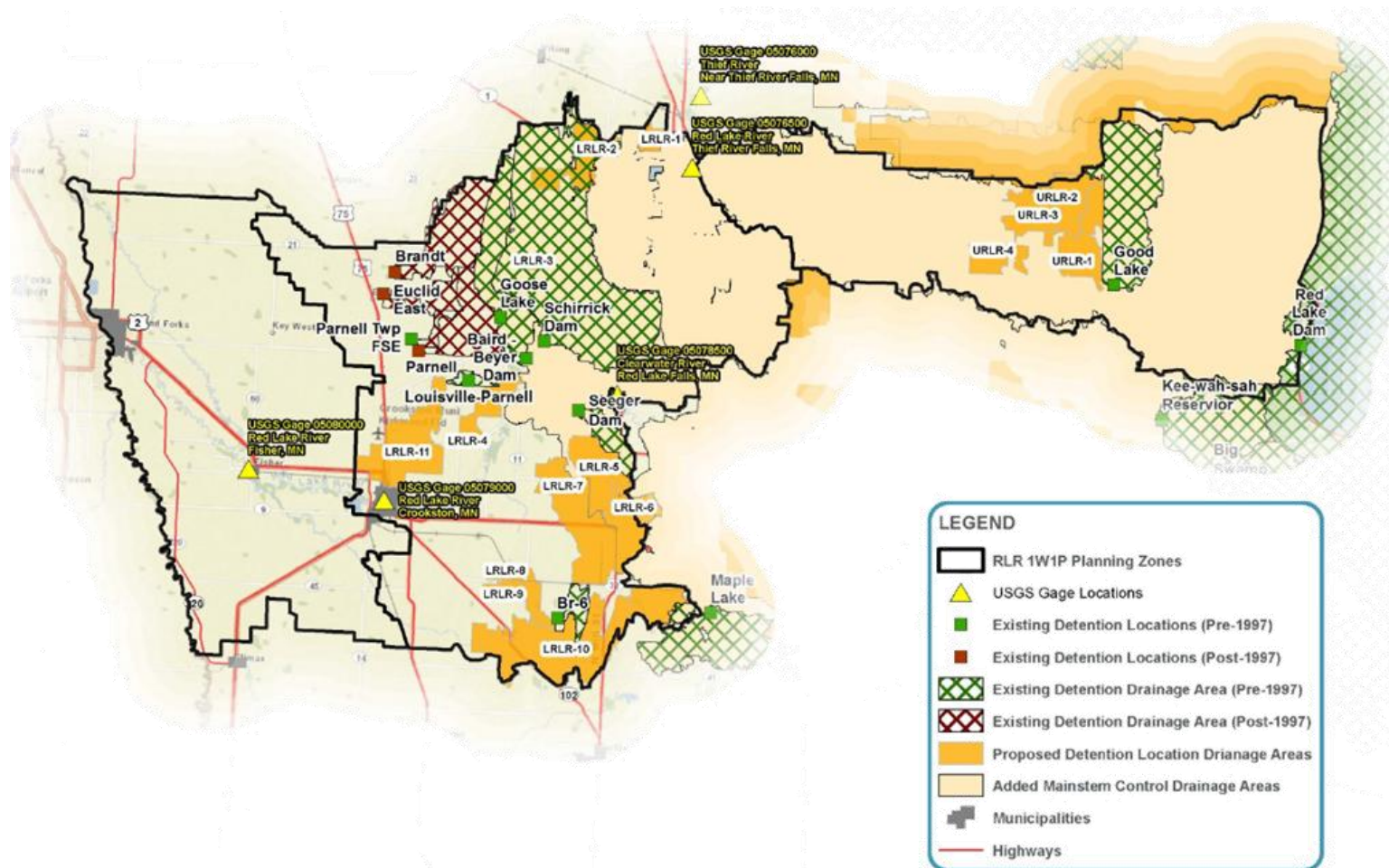
Case Study: Red Lake River 1W1P

Issue	Prioritization Statements	MGMT Area	Resource Of Concern	Measurable Goal
Flood Damage Reduction	Reduce flood flows and breakout flows to reduce damages to local communities, infrastructure, rural homes, and agricultural fields.	All	All	#BMPs (see 5.3 Implementation Plan)
	Reduce the risk of flood damage in accordance with the 20% Red River Basin Commission's Long Term Flood Solutions and Technical Paper # 11	All	Distributed detention basins chosen from LRLR1 – LRLR11 (Figure 4-4; Tables 4-11 and 4-12)	10,000 Ac-ft of gated storage in distributed detention basins (10-year goal)
Habitat	Protect, restore, and enhance grasslands and wetlands with special emphasis on prairie core areas and corridor complexes.	All	All	Prairie Core: 40% grassland and 20% wetland within remainder of cropland or other uses
				Prairie Corridor: 10% of each legal land section is to be maintained in permanent perennial cover
				Remainder of Prairie Region: maintain 10% of each Land Type Association in perennial native vegetation
	Protect or restore aquatic habitat of priority reaches.	L4*Activities listed in Chp 5	3-551 (Burnham Cr)	Increase Fish IBI to >24 (long term goal >35) Increase Macroinvertebrate IBI to >22
		M3	3-528 (Little Black River)	Increase Fish IBI to >42 (long term goal >42)
		M4	3-558 (Black River)	Increase Fish IBI to >47 (long term goal >47) Increase Macroinvertebrate IBI to >41 for station 12RD0012 (long term goal >41) and >37 for station 12RD102 (long term goal >37)
			3-557 (Black River)	Maintain or improve on 2015 Fish IBI (stations 07RD022 = 51, 10EM176 = 38, 12RD01450 = 27) Maintain 2015 Macroinvertebrate IBI's at both stations (stations 10EM176 >42 and 12RD014 >23)
		M5	3-545 (CD 96 Br. 5)	Increase Fish IBI to >12 (long term goal >23)
		M7	3-510 (Red Lake River)	Maintain 2015 Fish IBI (stations 10EM048 = 65 and 12RD113 = 74) Maintain 2015 Macroinvertebrate IBIs (stations 10EM048 >53 and 12RD113 >57)
			3-511 (Red Lake River)	Maintain 2015 Fish IBI (61) Maintain 2015 Macroinvertebrate IBI to >66
			3-512 (Red Lake River)	Maintain 2015 Fish IBI (83) Maintain 2015 Macroinvertebrate IBIs to >57
			3-529 (Black River)	Maintain 2015 Fish IBI (50) Maintain 2015 Macroinvertebrate IBIs to >45

Case Study: Red Lake River 1W1P

MGMT Area	Strategy	Best Management Practice	Total	Unit	Cost	Lead Entity	Year(s)
M1/M2: Brandt Imp.	Protection	Grade Stabilization Structure	1	Each	\$ 8,566	SWCD/NRCS	2017-2026
		Critical Area Planting	2	Acres	\$ 1,736	SWCD	2017-2026
		Tree/Shrub Establishment	30	Acres	\$ 13,579	SWCD	2017-2026
		Well Sealing	3	Each	\$ 1,500	SWCD	2017-2026
		Alternative Tile Intakes	2	Each	\$ 1,000	NRCS	2017-2026
		Septic System Upgrades	1	Each	\$ 8,000	SWCD/Environmental Services	2017-2026
		Upland Wildlife Habitat Management	3000	Acres	\$ 60,000	SWCD/Pheasants Forever/RLWD	2017-2026
		Restoration & Management of Rare/Declining Habitat	500	Acres	\$ 434,000	SWCD/Pheasants Forever/RLWD	2017-2026
		Prescribed Burning	200	Acres	\$ 20,000	SWCD/Pheasants Forever/RLWD	2017-2026
	Source Reduction	Residue and Tillage Management	3000	Acres	\$ 51,000	NRCS	2017-2026
		Nutrient Management	3000	Acres	\$ 1,950	NRCS	2017-2026
		Conservation Cover	600	Acres	\$ 384,068	NRCS	2017-2026
	Storage	Drainage Water Management (Tile)	60	Acres	\$ 63,360	NRCS/RLWD	2017-2026
	Filtration	Conservation Cover	3000	Acres	\$1,920,338	NRCS	2017-2026
		Cover Crop	10000	Acres	\$1,071,313	NRCS	2017-2026
		Filter Strips	5	Miles	\$ 13,580	SWCD/NRCS/RLWD	2017-2026
		Grass Waterways	0.25	Miles	\$ 7,019	SWCD/NRCS/RLWD	2017-2026
		Field Borders	4	Miles	\$ 2,680	NRCS	2017-2026

Case Study: Red Lake River 1W1P



Case Study: Red Lake River 1W1P

Table 4-11 Middle Planning Zone Proposed Tributary and Off-channel Distributed Detention Performance Estimates (RLWD 2013)

Middle Planning Zone	Peak Inflow (cfs)	Peak Outflow (cfs)	Reduction (cfs)	Peak Flow Reduction	Inflow Volume (ac-ft)	Outflow Volume (ac-ft)	Reduction (ac-ft)	Volume Reduction
LRLR-1	168	0	168	100.0%	931	0	931	100
LRLR-2	428	0	428	100.0%	3563	0	3563	100
LRLR-3	198	0	198	100.0%	1938	0	1938	100
LRLR-4	229	0	229	100.0%	1917	0	1917	100
LRLR-5	635	0	635	100.0%	5090	0	5090	100
LRLR-6	385	164	221	57.4%	3478	876	2602	74.8
LRLR-7	736	0	736	100.0%	6687	0	6687	100
LRLR-8	228	0	228	100.0%	1760	0	1760	100
LRLR-9	195	0	195	100.0%	1172	0	1172	100
LRLR-10	1099	687	412	37.5%	11811	5475	6336	53.6
LRLR-11	840	763	77	9.2%	6250	4987	1263	20.2
Total	5141	1614	3527	68.6%	44597	11338	33259	74.6%
Average	467	147	321	68.6%	4054	1031	3024	74.6%

Case Study: Red Lake River 1W1P

Table 4-13. Recommendations for streamflow protection and allowable appropriation for the Red Lake River applied at the USGS Gage at Crookston, MN (Gage number 05079000; from MnDNR 1997)

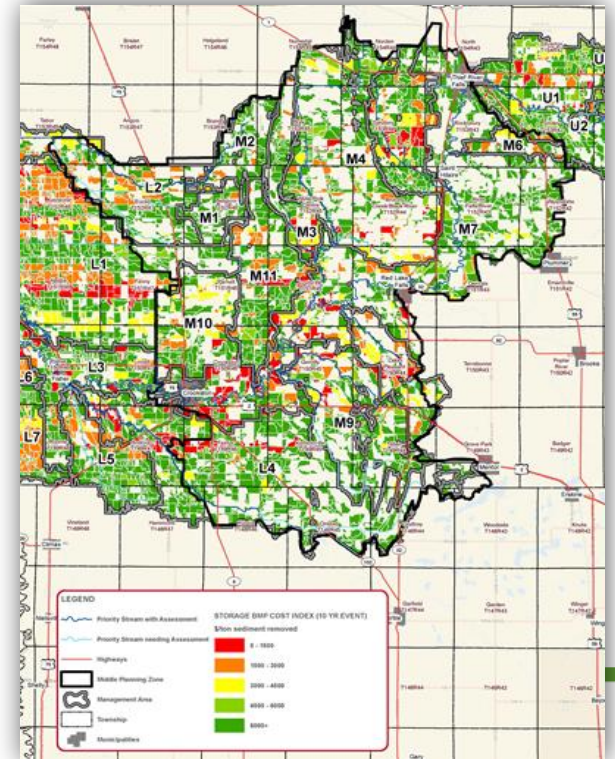
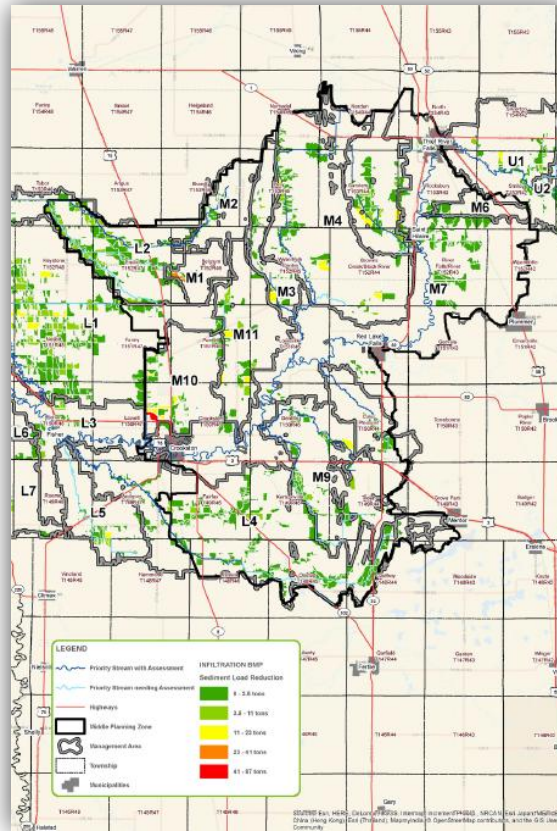
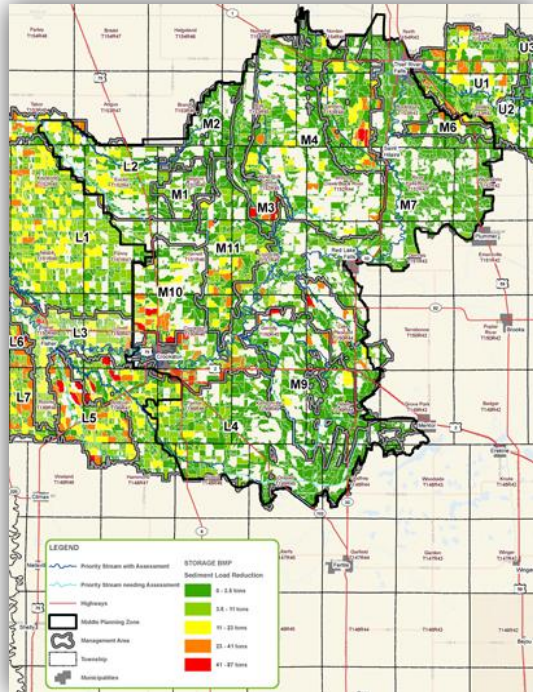
Season	CBF at Crookston gage	If flow at Crookston gage is...	...then the action is...
April 17 to May 29	676 cfs	>1014 cfs	appropriators may take their total permitted amount
		338 to 1014 cfs	appropriators may take a combined total of 135 cfs or the total their total permitted amount, whichever is less
		<338 cfs	suspend all appropriations
May 30 to April 16	413 cfs	>620 cfs	appropriators may take their total permitted amount
		207 to 619 cfs	appropriators may take a combined total of 135 cfs or the total their total permitted amount, whichever is less
		<207	suspend all appropriations

Case Study: Red Lake River 1W1P

	PTMApp Management Strategy				
	Protection	Source Reduction	Storage	Filtration	Infiltration
Best Management Strategy (BMP)	Channel Bed & Stream Channel Stabilization (NRCS 584 ¹)	Conservation Tillage	Drainage Water Management (NRCS 554 ¹)	Conservation Cover (NRCS 327 ¹)	Multi-Stage Ditch
	Critical Area Planting (NRCS 342 ¹)	Nutrient Management (NRCS 590 ¹)	Storm Water Retention Basins	Cover Crop (NRCS 340 ¹)	
	Grade Stabilization Structure (NRCS 410 ¹)	Rotational Grazing	Water and Sediment Control Basin (NRCS 638 ¹)	Filter Strips (NRCS 393 ¹)	
	Streambank and Shoreline Protection (NRCS 580 ¹)		Wetland Restoration (NRCS 657 ¹)	Grassed Waterway and Swales (NRCS 412 ¹)	
	Tree/Shrub Establishment (NRCS 612 ¹)				



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Questions?

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