

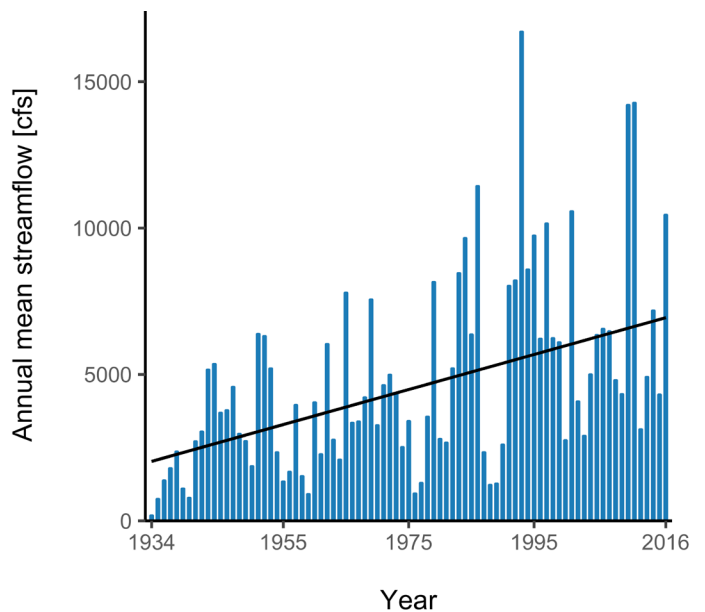
The Minnesota River is growing

Let's agree on the facts. Minnesota River flows are increasing. Opinions about why this is happening vary, but include some combination of change in climate, ground cover, and drainage. We list references at the end of this document if you want to delve into the nuances. But the data show **Minnesota River flow has increased** at an alarming rate over the last 60 years.

River widening

The result has been river widening throughout the watershed that is consuming, on average, 80 acres of land a year. That is about 6" per year distributed over the **13,000 parcels** along the Minnesota River and its tributaries that have steep banks, ravines, and bluffs. Land is devalued, crops and productivity lost, and infrastructure costs increase for local governments. Ask a landowner if they are okay with losing 15' of river frontage over the course of a 30-year mortgage.

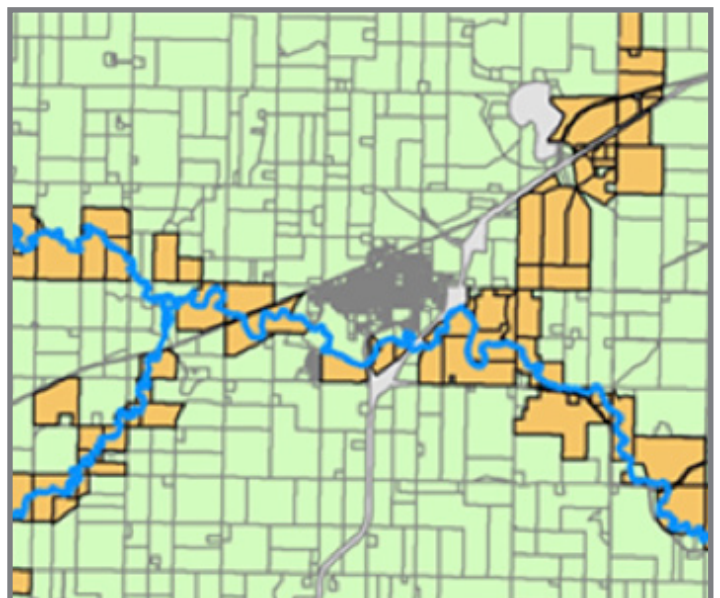
Average Annual Mean Daily Flow



Source: Data from USGS 05330000 – MINNESOTA RIVER NEAR JORDAN, showing Average Annual Mean Daily Flow in cubic feet per second.



Rivers have widened significantly due to increased flows. Schottler et al. (2014)



Eroding parcels that line the rivers in an area centered on Madelia lose an average of 6" per year.

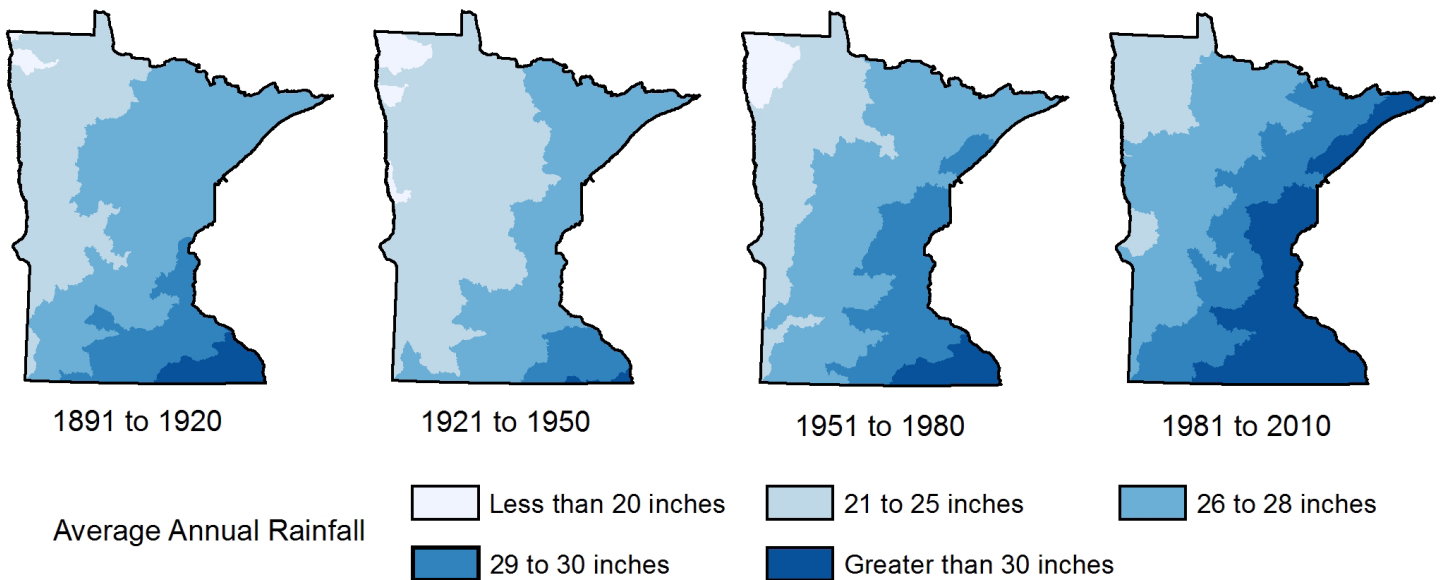
River dredging

Where does soil from those 80 acres end up? A lot of it is clogging the lower Minnesota River, the reach traveled by barges that deliver farm products to market and return with agricultural inputs. The channel is dredged with increasing frequency at taxpayer expense and we are running out of places to put the tons of dredged sand. The river fills in at about half an inch a year and will spill out of its banks more frequently, inundating fields and towns.

More rain in the basin

We know we don't have control over the weather. Modeled projections are for more intense April-June storms when there is little ground cover and an overall increase in annual precipitation. The precipitation patterns are shifting too, with more rain falling the in the Minnesota River basin. So even if we do nothing, the flows in the river will continue to increase with increased flooding and erosion.

Precipitation Change in Minnesota



*Adapted from Fields to Streams, University of Minnesota (2015) and Gupta, S.C., A.C. Kessler, and M.K. Brown (2014).
Based on data from MN DNR State Climatology Office*

We need storage

Water storage is a way to slow the erosion of crop land, reduce the downstream impacts of sediment and flooding, and save water for later use. The cumulative effect of each landowner helping a little bit, parcel by parcel, adds up. We don't have to recreate the original lake, wetland, and river network to benefit from storage. We can store water in a variety of places, and you might be surprised to learn the most effective ways to hold water back.

- **“Above” the ground.** A great deal of moisture evaporates. Perennial plant cover returns far more water to the atmosphere than annual crops, through evaporation and transpiration.

- **On the ground.** Impoundments, ditches, smaller culverts, temporary field flooding, lakes, and wetlands delay and reduce the volume of surface runoff.

- **Below the ground.** Long-term storage occurs by increasing the water holding capacity of the soil and through controlled drainage, allowing water to replenish both shallow and deep aquifers.

		Above ground		On ground		Below ground	
		Cover crops	Perennial crops	Restored wetlands	Detention basins	Reduced tillage	Controlled drainage
Increased	Spring transpiration	x	x				
	Surface water evaporation			x			
	Infiltration	x	x	x	x	x	
	Soil water retention	x	x			x	
Reduced	Total water delivery	x	x	x	x		x
	P and sediment delivery	x	x	x	x	x	
	Peak flows	x	x	x	x		x

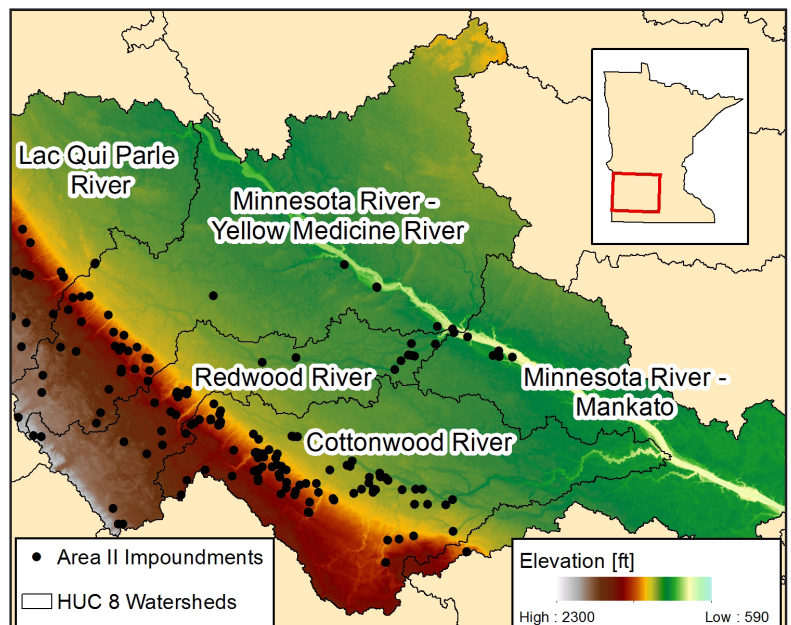
Organizing for storage

Folks in the Minnesota watershed may have “summit fatigue” from all of the attempts to meet and find a common goal for the watershed. Farmers are tired of being blamed and that approach gets us nowhere. Many farmers are willing to implement water storage solutions but lack financial incentive. Market-driven solutions are preferable to imposed conservation practices but lie far in the future.

In the meantime, it is necessary to create or modify an organization or consortium that will:

- Keep local control of financing and the decisions that prioritize the types and locations of projects
- Allow voluntary landowner participation with technical assistance and cost-sharing
- Generate local dollars to leverage state funds, which can in turn leverage federal USDA dollars

Multiple types of organizing bodies can be used to coordinate watershed management: watershed districts, watershed management organizations, even nonprofits. For example, Area II River Basin Projects Inc. was established in 1978 to address flood



Black dots indicate Area II water-storage projects including dams and culvert downsizing.

damages in six major watersheds in the western Minnesota River Basin. Landowners, members from nine counties, watershed districts, or partnering SWCDs bring projects to the Area II board for consideration. Staff engineers determine the feasibility and effectiveness of the projects, and estimate flow reductions and associated sediment and nutrient reductions at each location. Area II has constructed reservoirs and installed many road retention structures.

Local officials can influence which watershed management structure to use

ORGANIZATIONAL STRUCTURE	PRO	CON
Area II Inc. model	Voluntary, coordinates LGUs, attracts statewide funds	No funds for general management, all structural measures thus far
Watershed districts	Full authority to fund, local control, attracts state funds	Hard to establish unless counties support
Watershed management organizations via joint powers agreements	Right scale, promotes coordination	Can easily collapse when stressed
Minnesota River Basin Joint Powers Board-like	Controlled by LGUs	Hard to have single vision, no authority or money, failed once
County – 103B authority	Existing authority	Water is a secondary issue

Electronic version with links available on homepage (publications tab) of freshwater.org.

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Principle authors: Carrie Jennings, PG, Ph.D., Brian Bohman, Peggy Knapp, Edd